

FINANCIAL REINSURANCE

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FINANCIAL REINSURANCE

[A Discussion Meeting held by the Institute of Actuaries, 22 February 1993]

THE paper which is printed here has its roots in meetings of the General Insurance Study Group in 1991 and 1992 and the Discussion Meeting held by the Institute of Actuaries on 22 February 1993, based on a discussion document drawn up by a working party whose members were:

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This paper, compiled by D. H. Craighead, is largely derived from that discussion document, although the order in which the material is presented has been changed and account has been taken of points made in the discussion that took place at the meeting, together with advice and comment by P. H. Hinton, B.A., F.I.A.

Hence, it attempts to summarise actuarial standpoints within the United Kingdom on the subject of financial reinsurance, but not all actuaries will necessarily agree with all the views expressed.

ABSTRACT

This paper seeks to define and explain financial reinsurance, a type of reinsurance growing rapidly in the general insurance market. It provides criteria for underwriters and actuaries to understand the degree of risk transfer involved and the limitations on that risk transfer. It seeks to set out criteria, applicable to both insurer and reinsurer, for estimating reserves where financial reinsurance covers are involved and for compliance with supervisory requirements. Several examples are given of typical financial reinsurance contracts currently in use.

KEYWORDS

Financial Reinsurance; Reinsurance; Risk Capital in General Reinsurance

1. INTRODUCTION

THE paper is set out as follows:

- Section 2 explores the overall picture relating to financial reinsurance and the criteria that should be used when seeking to understand it.
- Section 3 carries the discussion into the background of the general insurance market and the place of financial reinsurance within it.
- Sections 4, 5 and 6 describe the various types of financial reinsurance contracts operating in the market and the reserving requirements that apply to each as far as concerns the reinsured:

- Section 4—Time and distance policies,
- Section 5—Loss portfolio transfers and aggregate stop loss contracts, and
- Section 6—Spread loss contracts.

- Section 7 sets out accounting and regulatory response requirements.
- Section 8 looks at the underwriting and reserving requirements of the reinsurer.
- Section 9 gives overall conclusions.
- Appendix A carries the text of three Department of Trade and Industry (DTI) letters written to insurers coming under its jurisdiction, setting out regulatory requirements in regard to financial reinsurance contracts.
- Appendix B gives several actual examples of financial reinsurance contracts, and comments on each.
- Appendix C sets out valuable and useful criteria in regard to the strength of reserving for all types of reinsurance, both conventional and financial.
- Appendix D carries an example of a Monte Carlo simulation as applied to a spread loss type of financial reinsurance.

2. NATURE OF FINANCIAL REINSURANCE

2.1 Although there are certain types of reinsurance contract known generally as 'financial reinsurance' (see Sections 4, 5 and 6), most attempts made to define financial reinsurance by drawing lines of distinction can be criticised in one way or another. With both financial and conventional reinsurance, it is important to understand the nature and degree of risk transfer.

2.2 Financial reinsurance, certainly in the volumes of business now being written, is a relatively new phenomenon in the general insurance market. The regulators and others, both in the U.K. and in the United States of America, are having to run to keep up with its evolution and development. The fast growth of the market has been driven by the shrinking capacity offered by the traditional reinsurance markets and by a significant increase in the cost of traditional reinsurance.

2.3 In these circumstances, financial reinsurers have sought to enter the market strongly by devising reinsurance programmes that provide partial cover only, usually being designed to suit particular needs. Unfortunately, some of the parties involved, including intermediaries, have over-stepped their brief by leaving impressions of benefits which are actually seriously circumscribed by the policies sold (see §§ 3.7 and 3.8). As a result, there has been a great deal of misunderstanding in the market, and regulators have been hard put to deal adequately with the problems resulting.

2.4.1 It is an over-simplification to see financial reinsurance at one end of the spectrum and conventional (traditional) reinsurance at the other end. There are

gradations in between. Financial reinsurance is a term applied to contracts where the specific insurance content accounts for a relatively small proportion.

2.4.2 All reinsurance can cover transfers of risk of up to three different types (of increasing volatility and hence of increasing danger):

- (1) The risk that rates of investment income presupposed will not be met. (All reinsurance has a banking or savings element.)
- (2) Timing risk of claim settlements.
- (3) Risk as to actual claim amounts—the number and quantum of claims hitting the layer of reinsurance.

2.4.3 Financial reinsurance may stop anywhere down this list, and may be arranged so as to cover the risk only up to a predetermined limit, depending on how the contract is structured. Hence, any attempt to define financial reinsurance on criteria based on how far down the list the contract goes, such as has been brought into use by the U.S. Financial Accounting Standards Board (FASB), may obscure the real issues.

2.4.4 Large variations exist in financial reinsurance contracts, from time and distance policies with no risk transfer other than that arising from the rate of return assumed, to sophisticated whole account prospective multi-layer contracts which can contain significant amounts of risk transfer.

2.4.5 Conventional reinsurance is often not of a pure risk transfer nature. Excess of loss treaties, which have the premiums relating to one or more underwriting years, adjusted on a burning cost basis, tend to reduce the totality of risk transfer and may do so to a large degree if there is a wide spread between the lower and upper limits of percentage. Proportional treaties, where there is a substantial profit commission, have a similar, but usually smaller, effect. Reinstatement premiums arise from the incidence of claims and are often large in amount. Even in the case of pure catastrophe cover the reinsurer will attempt to recoup losses in one year by raising premiums in the next year (but has no contractual right to do so).

2.5.1 It is essential that any purchaser of a financial reinsurance contract studies the conditions carefully and works out the effect of various possible scenarios that could face the office concerned. Only in such a way can the contract be evaluated.

2.5.2 A study of the contract should lead to an understanding of the nature and degree of risk transfer under the three headings set out in § 2.4.2.

2.5.3 The very names used for the contracts sold are often misleading, in that they appear to indicate a greater degree of risk transfer than is actually provided, and hence should not be seen as an indication of what is being offered.

2.5.4 The cedant should buy the reinsurance that most nearly fits its requirements (including value for money). It is a prime requirement that both buyer and seller understand what has been bought. Also, of course, the reinsurance should not be used to disguise the true condition of the cedant.

2.6 Most prospective financial reinsurance contracts are designed to cover

business written over some 5–10 years or even more, with a view to introducing a measure of stability. This feature contrasts with conventional reinsurance contracts where rates and other terms vary from year to year, with resultant increased volatility.

2.7.1 An insurer (or reinsurer) will buy reinsurance cover on a basis which often represents a compromise between the nature of the cover sought and the cost of that cover.

2.7.2 It is normally conventional reinsurance that comes closer to the nature of the cover desired, but in recent years the cost has become so high that many insurers have sought financial insurance contracts at a lower price, in spite of the reduced nature of the cover. Financial reinsurance may be bought in an attempt to replace conventional reinsurance without the insurer always understanding the nature of the reduction in cover.

3. THE GENERAL INSURANCE MARKET

3.1 To understand the strength of the forces which give rise to the purchase of financial reinsurance, it is useful to consider the great variety of risk portfolios and capital bases amongst insurers.

3.2 At one end of the spectrum we have relatively well capitalised insurers taking large numbers of risks which, individually, are small compared to their capital base. Accumulation risks (e.g. those due to catastrophic events) are often substantially reinsured, though insurers can be caught out; an example is the way economic conditions have resulted in significant losses being made on portfolios of mortgage indemnity and other credit contracts.

3.3 At the other end of the spectrum we have the high risk end of 'London Market' business. Though large quantities of small risks, especially motor, are written in Lloyd's, the London Market tends to concentrate on substantial commercial risks and reinsurance. London Market insurers and reinsurers tend to 'sweat' their capital harder than other U.K. insurers, taking risks which individually represent a much larger proportion of their capital.

3.4 Much publicity has been given recently to the London Market excess of loss (LMX) 'spiral', whereby reinsurers were reinsuring each other on an excess of loss basis, each taking a large gross exposure, but usually intending, after reinsurance, to take a small net exposure to any one loss event. It turned out that, because of the opacity of many of the risks assumed by way of reinsurance, the London Market as a whole had accepted more exposure to individual loss events than the capital base could comfortably stand.

3.5 Very large losses resulting from a series of major catastrophes in the period 1987–90 (including European storms in 1987 and 1990, Piper Alpha in 1988 and Hurricane Hugo in 1989) have given rise to some major restructuring in the London Market, a process which is still continuing. The losses significantly weakened the capital base of many companies, and different ways were sought to mitigate the problems, including the purchase of financial reinsurance, as the

capacity for reinsurance had shrunk dramatically with prices of traditional reinsurance escalating significantly.

3.6 General insurance is a notoriously cyclical business. The market attempts to recover losses by increasing rates, more players thus move in and rates are again driven down. London Market business is, if anything, more cyclical than that of many other insurance markets. It is also more exposed to variability in the losses themselves.

3.7 In times of uncertainty, when new capital is scarce and expensive, it is easy to see the attractions of financial reinsurance to an insurance or reinsurance company management. A desire always exists to smooth results, and there tends to be more variability to be smoothed out in the London Market. Similarly with capital employed; financial reinsurance has been used to make capital 'seem to go further', whether by reducing total reserves for past exposure, putting liabilities off the balance sheet, or reducing net premiums and thus reducing the solvency margin required to service a given volume of risk acceptances.

3.8.1 Financial reinsurance can be used as a financial engineering tool to mask the true position of a company, and is sometimes viewed as a way to continue trading. It is important that the board, the management and the auditors of a company are fully advised of all financial reinsurance arrangements entered into by underwriters, and that they understand them fully. There have been cases, for example, where time and distance type financial reinsurance policies have been purchased which provided claim recoveries maturing well after the claims themselves had been settled, resulting in the company having insufficient cash available at the right time. It can also result in an effective discounting of claims for longer periods than the terms to payment.

3.8.2 To help management evaluate the financial effect on the company, actuaries engaged in setting reserves should be made fully aware of the contracts and their actual and possible effects on the revenue accounts and balance sheets. Full disclosure in the statutory returns is essential. It is currently not possible to be sure what effect financial reinsurance is having on insurance company balance sheets, as the quality and quantity of disclosures tend to vary in the accounts.

3.9 Clearly, each company should aim to maintain an adequate capital base, so that it will have no reason for seeking to disguise the true nature of its financial condition. Gearing is a very useful tool in financial structuring, but the amount of capital required should also be a function of the degree of uncertainty in the results, and, in any case, gearing should be in a holding company rather than in the insurance company itself.

3.10 For a brief description of guidance given by the accounting profession, the ABI, the DTI and FASB of the U.S.A., among others, see Section 7.

4. TIME AND DISTANCE POLICIES

4.1.1 These policies are designed to discount the reserves in situations where reserves are not explicitly discounted for the time value of money. A series of

known recoveries on fixed dates is hypothecated as 'providing cover for' the real liabilities, namely a series of unknown claims on unknown dates.

4.1.2 The terms of a typical contract are set out in Appendix B.

4.1.3 The payments are made, not when claims arise, but at pre-determined dates. Thus, there is no transfer of either underwriting or timing risk. Few regard these as true insurance contracts. The balance sheet is apparently strengthened and future investment income lost. The probable mismatching between the reinsured's claims and payments means that a time and distance policy has little use as a true insurance policy in the sense of ceding premium in return for protection against adverse circumstances. Its chief use is to avoid admitting that reserves have been discounted. These contracts are used extensively in Lloyd's to allow an equitable RITC (reinsurance to close) between incoming and outgoing Names to be achieved; this is correct in principle only if the assumed costs of the claims to which the discounting is applied are fully adequate.

4.2 An advantage of a time and distance policy is that, by separating out the investment risk, the reinsurer is able to concentrate on maximising the investment return, often by use of a non-U.K. domicile, such as Bermuda, and through the use of investment expertise, while the cedant is relieved of the dichotomy that exists in an insurance office between maximising returns and minimising the mistiming risk. In fact, competition has pressed reinsurers to the point that the investment return assumed in calculating the repayment pattern is at a maximum, and may be difficult to attain without some risk of ultimately showing adverse results.

4.3.1 The apparent tax advantage of carrying offshore investments is largely misleading. Its use leads to an immediate apparent increase in profit, with the result that increased tax is payable up front.

4.3.2 In the case of Lloyd's syndicates, capital gains on the trust funds held for taxation purposes resulted in the usual benefits from:

- indexation,
- offsetting against capital losses elsewhere, and
- the special advantage of short-dated gilts.

The use of time and distance policies could have led to a substantial tax loss in respect of these capital gains advantages occurring to Lloyd's Names, but that disadvantage is now disappearing in terms of new tax legislation to be embodied in the 1993 Income Tax Act.

4.3.3 There may also be dangers in reinsuring to an offshore reinsurance, particularly where a large investment is involved, as in some locations supervision may be inadequate or even non-existent (though a number have recently improved) and, in any case, a different supervisory and legal system will have features which a U.K. cedant might not fully understand.

4.4 In the absence of clear guidance for the treatment of time and distance policies, and with such policies structured in many different ways, the audited accounts indicate that various differing approaches are being used. Some

auditors agree to the company taking full credit for the face value (i.e. the ultimate value of the recoveries) provided that there is a reasonable likelihood that there will be no need to draw early on the policy, thus incurring interest penalties. Some auditors do not agree with that approach. What is important is that there is a full disclosure in the accounts.

4.5 From an actuarial viewpoint, there are three aspects which must be considered with regard to the use of time and distance contracts.

4.5.1 Although the practice of following a reserving process without discounting allows for some measure of protection of the adequacy of the reserves, a far preferable approach would be to set reserves which are adequate in the first instance, ignoring investment income, and then to discount those reserves. In particular a number of items can be identified as leading to an increase in claims over and above expected amounts, for example:

- (1) The possible effects of both stochastic variability and of new types of claims from sources under risk in the underwriting year concerned, but which have not yet given rise to actual claims.
- (2) The costs of claims administration during the run-off period. These should already have been added to the claim reserve amounts, but it has not so far been the consistent practice of the reinsurance market to identify those expenses separately, despite the ABI SORP, and to increase the reserve accordingly.
- (3) Very long-tail liability claims, escalating well beyond expectations; escalation of claims due to inflationary effects far in excess of those applying to measures such as the retail price index or to the rates of claims inflation that have occurred in the past, particularly as they affect excess loss reinsurance that does not include satisfactory inflation clauses.
- (4) The effect of latent claims, not only those for such impairments as asbestosis and such factors as repetitive strain injury, industrial deafness and the residual effects of smoking, that are known to have occurred in the past, but also for others yet unforeseen.
- (5) The tendency of the American courts to widen the scope of contract wordings beyond that which was anticipated by the parties when the insurance and reinsurance policies were written.

This list is by no means exhaustive. While it may be difficult to arrive at satisfactory reserves for factors of this nature, it is becoming increasingly necessary to develop methods of estimating such extra reserves as may be required before a discounting factor is applied.

4.5.2 The purchase of time and distance policies introduces a risk for the reinsured, whatever the accounting policies imply. The timing of the recoveries due from the reinsurer, however carefully determined at inception, is highly likely to depart from the actual dates of settlement that arise in practice. An extra mismatching reserve is required. The amount will be a matter of judgement, dependent on the terms of the policy governing early drawings, the size of the

policy in comparison with the overall assets of the company and the degree of variability judged likely in claim settlement dates after allowing for inflationary drift.

4.5.3 The security of the reinsurer must be considered, with a view to deciding whether to hold an extra reserve for bad debts. Have letters of credit or other satisfactory safeguards such as trust funds been provided? How safe are they under extreme pressures?

4.6.1 The traditional approach to the determination of reserving levels on long-tail business involves the use of undiscounted reserves to cover possible adverse fluctuations and the possible effect of unquantifiable factors such as are set out in § 4.5.1. To this extent, it can be regarded as implicit discounting. If nothing else, the use of time and distance policies brings the factor out into the open and provides a path for effective discounting.

4.6.2 A danger exists inasmuch as a time and distance policy may be purchased after implicit or explicit discounting. Such action is, in effect, double discounting, and may easily occur inadvertently, particularly in the case of a weak company.

4.6.3 For all the cautions mentioned above, properly estimated reserves discounted give a more accurate picture of the office than do conventional methods, particularly in regard to very-long-tail business.

5. LOSS PORTFOLIO TRANSFERS AND AGGREGATE STOP LOSS CONTRACTS

5.1 These terms describe reinsurances found in conventional reinsurance. In the following it is the use of the same terms, applied to particular types of financial reinsurance, that is being described. Contracts of this nature are usually purchased at the point when a year relating to a funded account is being closed. They are sometimes used to 'clean up' an insurer's claims reserves as part of a restructuring or takeover deal. Such policies are, however, unacceptable to Lloyd's if they interfere with the fair and equitable distribution of underwriting results between outgoing names and incoming names.

5.2 These two types of reinsurance policies are somewhat different in nature, but both pay certain defined amounts of claim when they arise in an insurer's portfolio. There is little or no transfer of underwriting risk as the claim amounts are generally known, but there are usually timing and investment risks for the reinsurer. The premium is based on the expected claim amounts discounted from their probable payment dates. The reinsured can, therefore, reduce undiscounted reserves by more than the amount of the premium, and the balance sheet is apparently strengthened. However, future investment income is lost and the company may lose profit overall and bring forward its tax payments. For a mutual company that cannot offset underwriting losses against investment income for tax purposes these policies can have a tax advantage, provided the tax authorities do not raise objections.

5.3.1 These contracts embody an excess point and a limit, the calculations of

the relevant amounts stemming from consideration of the reserves estimated as being required. The aggregate policy may also be written in the nature of a prospective aggregate policy, where the expected loss amounts will stem from an understanding of the nature of the underwriting policy of the cedant. In such cases, the prospective claim amounts covered are carefully circumscribed by the clauses of the reinsurance policy, but there is still a timing risk accepted by the reinsurer.

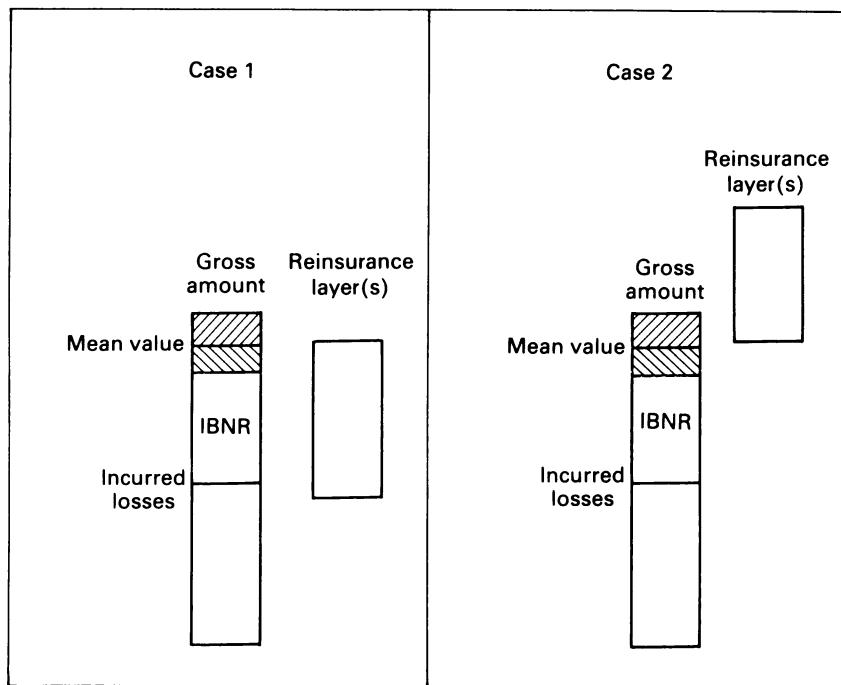
5.3.2 Where a pure discounting process is involved, the repayment pattern is pre-set, and the same considerations exist in setting the level of reserves for the cedant office as in the case of time and distance reinsurance.

5.3.3 Normally the repayment pattern is allowed to follow the actual claim settlement pattern of the cedant, the reinsurer then accepting a timing risk. The terms of the reinsurance will then involve a premium. Alternatively, the excess point and/or the limit rises with each year elapsed, the rise being calculated on the additional time elapsing, and hence being derived from investment income.

5.3.4 A transfer of claim amount would involve the reinsurer's providing for reinsurance recoveries higher than were anticipated when the reinsurance was written, but within the ceiling provided by the limit point. Reinsurance of that nature requires a very careful assessment by the reinsurer of the adequacy of the reserving level set and the charging of a full risk premium. The risk can be reduced by an automatic pre-set increase in the excess point year by year, but the premium charged should then be reduced accordingly. In assessing the value of such a contract, the degree of risk transfer must be weighed against the margin of profit required by the reinsurer. If there is a risk transfer which involves limits, then it is necessary to bring into the calculations the effect of possible variability from stochastic or other sources. The danger of failure, when considering the effect of reinsurance, to examine variations in the gross reserve from its mean expected value, is perhaps best illustrated by Figure 1. Case 1 is the dangerous situation. It will be seen that the mean expected value leaves only the original excess amount as the net liability (unless there is a small self-retention, the effect of which is likely to be relatively minor). A decrease leaves the net liability unchanged. An increase, on the other hand, leads to a substantial extra net liability arising from vertical exhaustion. Hence, the separate gross and reinsured provisions must be considered using a distribution of claims.

5.3.6 To illustrate further the dangers arising from the use of mean estimated reserves, consider the following case in conventional reinsurance, which is somewhat extreme, but illustrates the point well:

- (1) Assume a company has bought a whole account aggregate stop loss policy in advance in respect of a particular year's trading. All other policies inure to the benefit of this one. Assume that the business concerned is long tail with considerable uncertainty in its outcome, and ignore the question of investment income, which has been covered above. After 4 years the reserve



an increase from the expected mean value

a decrease from the expected mean value

Figure 1. Variations in the gross reserve from the mean expected value.

position (assuming for purposes of clarity that it is appropriate to reserve the mean expected value), is as follows:

	£m
(a) Mean expected net liability before aggregate policy	50
(b) Cover under policy £40m excess of £10m (policy limit is £50m)	<u>(40)</u>
(c) Net liability	<u>10</u>

- (2) How sensible is the net liability of £10m? If it was sensible to start with £50m, how sensible is it to deduct or set up an amount for £40m in respect of the reinsurance policy?

- (3) It all depends on the uncertainty attaching to the £50m. If this amount was certain (and also if matters such as financing costs between claims payment and reinsurance recovery are ignored as part of issue of the time value of money) a deduction of £40m and a net liability of £10m could well be sensible. In practice, however, the £50m will be a representation of an unknown and probably skew probability distribution. For the sake of argument assume that the £50m is made up of two equally likely discrete outcomes, £35m and £65m. This exposes the danger of taking credit for reinsurance of £40m in the example. The net liability has two equally likely outcomes of $\text{£}(65 - 40)\text{m} = \text{£}25\text{m}$ and $\text{£}(35 - 25)\text{m} = \text{£}10\text{m}$. The mean expected net liability is thus $\text{£}(25 + 10)/2 = \text{£}17.5\text{m}$, compared to the £10m actually booked, and the mean expected value of the reinsurance is $\text{£}(40 + 25)/2 = \text{£}32.5\text{m}$, not £40m. If a profit commission is involved, then the ultimate result will be somewhat different, but a distortion in the result still arises.
- (4) This fallacy, of treating a mean estimated gross liability as a deterministic figure and from there deducing the reinsurance only recoveries, is almost universal. The phenomenon occurs in excess of loss reinsurance; it does not occur in proportional reinsurance.
- (5) The fallacy has long been known in regard to conventional reinsurance, but also arises in financial reinsurance contracts, which are frequently arranged in the form of whole account or aggregate excess of loss contracts or spread loss type policies (see Section 6). The conclusion to be drawn is that either a simulation approach to insurance reserving is required or, at the very least, the existing generally adopted approaches should be modified in some way to reflect the stochastic, or uncertain, nature of insurance.

6. SPREAD LOSS AND SIMILAR CONTRACTS

6.1 Spread Loss Contracts

6.1.1 A typical spread loss contract is usually for a fixed number of years with premiums payable annually, the amount fixed in advance. The claims are paid either when losses are paid by the reinsured or on a fixed date each year. The total claims are subject to an aggregate. The paid claims are sometimes not permitted to exceed a multiple of the premium payable. A claim can be made immediately on a contract, and, in this case, the 'renewal' premium may rise. The insured often has the right to cancel the contract if the increase is unacceptable, but the balance of funds owing, with a preset penalty, has to be repaid to the insurer.

6.1.2 On cancellation or termination, a profit commission is usually payable of up to, say, 95% of the premiums paid less claims paid.

6.1.3 The essence of a spread loss policy is the core experience rating account, by which mechanism the total of premiums (or a percentage thereof) less claims

is carried forward from year to year. The cancellation clause determines the position on termination.

6.1.4 Previously, the arguments in favour of these types of contract were that they smoothed results from year to year and helped cedants' long-term planning, by providing reinsurance over a number of years at guaranteed rates.

6.1.5 The real difficulty is not so much the accounting rules that must be applied, but that after a claim there is a pay-back liability that must be recognised.

6.1.6 The DTI has recently reminded companies of the implications of existing accounting rules as they should apply to spread loss policies (see letters in Appendix A), the application of which eliminates any possibility of divergence of opinion in the matter. These policies have increased in number recently, following the decrease in traditional LMX capacity. Financial reinsurance policies where there is some, but very limited, transfer of risk may not, in fact, differ all that much from current conventional catastrophe reinsurance, where a medium layer cover may be quoted at 40% rate on line with 100% reinstatement premiums, giving a net return of only 20% on one total loss in a year or 40% of two total losses; or at 50% rate on line with 50% reinstatement premiums, which returns 25% of one total loss or 50% of two total losses to the layer, with a net cost of 40% or 50% respectively when there are no losses to the layer.

6.1.7 A popular variant on the spread loss policy uses an experience account. Basically, the reinsurer maintains a bank account which can go negative, the balance in which is not intended to be reflected in the cedant's financial statements. The experience account tends to drive renewal terms, and will usually be the basis from which the non-renewal or cancellation terms are determined. One real benefit which these policies can give is a line of credit to the reinsured which may not be easily available elsewhere at a time of cash shortage, but, in this case also, the practice runs counter to DTI requirements if the true position, when there is a negative balance in the experience account, is not reflected in the accounts.

6.2 Financial Quota Share

As in traditional quota share, the reinsured cedes premium to the reinsurer, but, unlike traditional quota share, the reinsurer's potential losses are not unlimited, but are limited to a percentage of the ceded premium. The reinsured increases its perceived gross underwriting capacity, but the cover provided may be insufficient to cover ultimate losses.

6.3 Hybrid Contracts

Hybrid contracts consist of an element of traditional, as well as financial, reinsurance. The varieties of contracts are numerous, but, to give an example, a catastrophe excess of loss contract can be a traditional contract for the first loss,

but, if a subsequent loss takes place, an equalising refund account is set up, and future premiums are paid to reduce the account to zero over a specified number of years. With the high level of catastrophe premiums and levels of reinstatement premiums, some traditional contracts could almost be defined to be 'no loss contracts' if only one loss is incurred. The brokerage payable on many of these contracts can be considerably less than on traditional contracts, but can still be substantial.

6.4 Finite Risk Reinsurance

With the many different debates which have taken place in the U.S.A., especially on what constitutes risk transfer, contracts have been designed to get over the various thresholds of definition, and this has led to a large market in finite reinsurance. These contracts do carry a risk transfer, which usually constitutes more than just timing risk, but, as the name implies, the level of risk covered is finite and less than in conventional reinsurance. The mechanisms of risk limitation vary, but can include provisions which reduce the likelihood of early payment on retrospective policies, provisions for extra premiums following unfavourable experience and the use of experience funds.

6.5 Effectiveness of Contracts

6.5.1 The cover provided by financial reinsurance is limited, and there may be pre-funding of losses. There may also be mismatching between the original contracts and the financial reinsurance, leaving the reinsured exposed. The penalties for cancellation can be severe, and the investment returns are sometimes low. Regulators and tax authorities are often concerned by the ability of financial reinsurance contracts to be used to circumvent accounting, solvency and taxation rules. There may be changes to the reinsured's balance sheet or profit and loss account with no change to the underlying reality. If the accounting rules for financial reinsurance are tightened, including more clarity in the basic reserving principles (see Section 6.8), many of the perceived advantages may disappear (but some will still remain).

6.5.2 Financial reinsurers, however, disagree with these arguments, and hold that more adequately drafted accounting rules would give a truer picture of the full development of the reinsurance and hence of their benefits.

6.5.3 If market imperfections are ignored (a rather large assumption at the moment), reinsurance can be expected in the long term to entail a cost to the cedant company, this being the price paid for smoothing of results and maintaining solvency.

6.6 Spread loss contracts are designed chiefly to cover low-frequency high-severity claims. The accounts they cover are exposed throughout the life of the spread loss contract to the possibility of such losses. Some examples of the contracts are given in Appendix B.

6.7.1.1 Variations in the natures of these contracts are considerable, and the reserving process followed must stem from the precise nature of the contract and of the degree of risk transfer actually attained (see Section 2.4).

6.7.1.2 If there is a risk transfer in terms of claim amounts, then it becomes necessary to understand what limits exist (both excess point and limit), and to what extent, if any, those limits can change in conformity with timing and other development patterns.

6.7.1.3 Spread loss contracts are long-term reinsurance arrangements, whereby annual premiums are adjusted to reflect the prior loss of the contract and prevailing interest rates, so as to ensure a reasonable long-term profit to the reinsurer. They seek to provide cedants with guaranteed continuity of cover at prices which, although they may be dependent on loss experience, are agreed in advance, the price being adjusted by increasing the premium or decreasing the coverage after a claim; thus the premium is lower (or the coverage larger) before a claim than after. Their value must be judged by the purpose of their introduction and their net premium cost.

6.7.2.1 It is generally easier to value such contracts, not on the basis of probability distributions, but on the basis of scenario analysis, where a model of the contract is built up and tested under several different outcomes. In particular, the reaction of the contract to extreme values of these underlying assumptions should be tested. For an underwriter considering acceptance of a financial reinsurance contract offered, an essential requirement, once the terms of the contract itself have been fully understood, is to examine its possible outcomes.

6.7.2.2 The terms will indicate the full nature and limitations of any risk transfer, and so enable the underwriter to determine whether the cost is justified in terms of the resultant benefits.

6.7.2.3 The most complete analysis requires a Monte Carlo type computer run of the sort described in Appendix D, using several different assumptions as to the claim risk factors involved. An investigation of that type is elaborate and requires time to complete, but such is the size of many of the contracts involved that a full analysis may well be justified.

6.7.2.4 On the other hand, a very good insight into the operations of the contract may be obtained by noting down several possible outcomes over a number of years in respect of the possibility of one, two or several large claims of different amounts and at different points of time, each hitting the layer of reinsurance covered by the contract. Each such analysis should show anticipated cash flows in respect of claim settlements, premiums payable from year to year, the premium retained by the reinsurer, the build up of the 'notional experience account' and the penalties payable by reinsurer or reinsured or cancellation of the contract. Spread sheet techniques may be useful in such an exercise.

6.7.2.5 A parallel exercise should then be completed for a conventional reinsurance contract with the same limits and covering the same portfolio at the rates currently obtainable in the market. The two effects can then be fairly directly compared, so as to give comparative benefits and costs.

6.8 Reserving in the Accounts of the Cedant

6.8.1 Conflicting attitudes exist as to reserving requirements, and, to examine them in all their implications, it is best to start first with the more straightforward spread loss contract.

6.8.2.1 For reserves before claims have arisen (or when small claims have arisen, below the balance in the experience account) the options are:

- Basis A.* A nil allowance—this is analogous to the reserve allowance that would be made for a traditional catastrophe occurrence.
- Basis B.* The recovery that would be made by the cedant if the contract were to be cancelled by either the cedant or the reinsurer at that point in time. If there are different bases as to who cancels, then it would be wise to use that basis which is more onerous to the cedant.
- Basis C.* The amount of the ‘fund’, i.e. the balance on the notional experience account that would be available for set-off in the event of a future claim.
- Basis D.* The amount charged to the revenue account in respect of reinsurance costs is the long-term expected average cost. A stochastic model is needed to set this amount. The differences between this amount and the reinsurance premiums actually paid are accumulated. This accumulation represents a reserve to cover possible future excess reinsurance costs. This reinsurance cost equalisation reserve is analogous to a claims equalisation reserve. It should be noted that this treatment will, in general, act to increase the net reserves when claims experience has been favourable (as one would expect from an equalisation reserve).

6.8.2.2 Basis A fails to recognise the off-balance sheet asset a purchaser of this kind of reinsurance builds up if there are claim-free years immediately after inception. It would seem appropriate, therefore, to disclose a value for this amount, if it is substantial compared to the company’s net asset value or solvency margin. Bases B and C recognise a value for this asset, but both fail, as does Basis A, to spread the full cost of the reinsurance to the underlying exposures they cover.

6.8.2.3 The logical step would seem to be to use the lower of the amounts given by Bases B and D. This will result in an amount to be deducted from the liabilities otherwise estimated for the office. Even if the cedant ceases writing business or becomes insolvent, the recovery referred to in Basis B still applies, and is usually a high percentage of the ‘fund’ remaining.

6.8.2.4 In an ideal world, the reinsurer would hold reserves at least equal to those held by the reinsured for the same contract, and the reinsurer should certainly hold reserves as above.

6.8.2.5 The amount estimated according to Basis D, will depend on the assumptions made as to the likely frequency of claims and on the level of the layer reinsured. For safety, the exercise should be repeated for a larger and smaller

amount of total loss within the bounds of reasonable probability factors before the actual reserve to carry forward has been set.

6.8.2.6 For a relatively low layer (a ‘working layer’ in market description), the probability of impact by at least one large (catastrophe) claim in any one year may be as high as 40%. For a high level cover, it may be judged to be very low, depending on the nature and scope of coverage, but, perhaps, in the model it would be unwise to assume a frequency at less than about 15%.

6.8.3 Reserves once a Claim has Occurred

Once a claim has occurred that exceeds the fund balance in the account, it is essential, by reference to accounting standards and ABI requirements, that the full amount of the pay-back liability is shown as an addition to the reserves. A case could be made, in the case of high-level reinsurance, for account to be taken of the possibility of premiums payable in the future years of the contract, without further claims arising, to be used in a partial reduction of the pay-back amount (for which a simulation check could be made as described in Basis D), but such modifications are almost always precluded by the terms of cancellation if the reinsured cancels the contract or is insolvent. On a going concern basis this latter argument does not apply, and the terms of cancellation by the reinsurer become important.

6.8.4 Once a large loss has occurred, such as to affect the layer, or in a long-tail liability account covered by an aggregate type reinsurance contract, a substantial claims total has been built up and an estimated ultimate total liability has been determined (usually after deduction of all prior reinsurances of the conventional type), then the precise terms of the pay-back liability can be set. These figures should then be examined as to future cancellation effects, in a manner similar to that suggested for the underwriter (see Section 6.7.1), in order to quantify the worst position that can arise.

6.8.5 Furthermore, timing factors may complicate the picture still further (see Section 6.9).

6.8.6 Each contract is highly complex, requiring very detailed attention. The cancellation options are often the governing factors. The run-off position may be more adverse than for a going-concern problem.

6.9 Applying General Reasoning to an Unusual Retrospective Policy

6.9.1 As a way of testing approaches to reinsurance reserving applying general reasoning, consider the following policy:

- (1) Background: company’s reserve for the old underwriting years is set at £100m at $t=0$. There is a history of reserve deteriorations and the account has a very long tail.
- (2) Policy to pay £80m in excess of x , with x set initially at £20m. Payments are once a year.

- (3) The excess point x is a function of the ultimate loss estimates and time.
 $x(t) = \text{maximum } (x(t-1), \text{ paid claims since } t=0 + \text{outstanding claims } (t) + \text{IBNR } (t) - £80\text{m})$
 where outstanding claims and IBNR are set in audited accounts.
- (4) Premium is £30m.
- (5) Experience fund calculation is maintained by the reinsurer. This is set as 95% of premium, less claims, all accumulated at base rate less 2% p.a. compound.
- (6) Option at any time after 5 years to take the balance of the experience fund in full commutation of the policy.

6.9.2 This policy, if accounted to show a reduction in net reserves of £80m, has the effect of releasing £50m, being the excess of policy proceeds over the purchase price. It also guarantees the return of most of the purchase price with interest. It, therefore, appears very attractive to a management wishing to release capital or to avoid calling for capital.

6.9.3 On further consideration, however, the peculiar effects of this policy, as conventionally accounted, will give cause for concern. The policy pays the *last* £80m of the run-off. If the account run-off is as currently assessed, the reserves held after the first £20m of claims are settled (the excess point) will be nil. Thereafter, the company will have to finance claims until the annual reimbursement from the reinsurer, and will have to meet its own expenses relating to the claims. Any subsequent deterioration in the ultimate loss will mean a cessation of reinsurance recoveries for the time being.

6.9.4 If the account runs off less favourably than planned, the excess point will move away, thus ensuring the reinsurer pays later than expected. A seriously deteriorating account with a very long tail could involve almost indefinite deferral of the recoveries, with all claim payments, in the meantime, being made net by the reinsured.

6.9.5 If, as may well be the case, the reinsured has bought the policy to continue trading, the time may come when he runs out of cash. At this point he may consider commuting the policy; if the amount he receives in commutation is significantly below the credit previously taken, he could then appear to be insolvent.

6.9.6 On the other hand, if claims are settled more rapidly than expected, then the reinsurer is exposed to losses on the timing risk.

6.9.7 A variation of this policy could have a fixed excess point, but with extra premiums payable (with or without increased policy limits) when the ultimate loss estimate deteriorates. Depending on the precise terms, this variant can have similarly dangerous cash flow implications in the long term.

6.9.8 Applying general reasoning to the substance of this policy, what value should be placed on it? The policy has been used to discount implicitly, and the reinsurer has been exposed to a timing risk only. The minimum value of the policy must relate to the commutation option, and should be assessed as the value now of the commutation at the 5-year point. This would be somewhat less

than 95% of the premium, in view of the reinsurer's interest margin over base rate. Considering the potential deferral of recoveries under the policy, it would not be sound to take credit in excess of the minimum value.

6.10 If both a discounting arrangement and a partial or complete transfer of claim amount risk are involved, then the reserves set up should take both those factors into account.

6.11 The pattern of probable results can be indicated by a full Monte Carlo simulation, but a very effective picture can be built up by adding a little to the gross reserves calculated and using a spread sheet type analysis to track the resultant net effect.

7. ACCOUNTING AND REGULATORY RESPONSES

7.1 This section reviews the regulatory developments in the U.S.A., the U.K. and the E.C., and discusses how the regulators are coping with the problems posed by financial reinsurance. For this purpose, work by the accounting profession and industry bodies to develop accounting standards is considered to be part of the regulatory process. It is interesting to note that the actuarial profession's contributions to these issues appear to have been greatest in the U.S.A.

7.2 Perhaps the most significant development coming from Europe is the E.C. Insurance Accounts Directive. The DTI is currently considering the U.K. legislation needed to implement this directive. The new legislation will apply to annual accounts prepared for the financial year starting on or after 1 January 1995. The provisions of this directive relevant to financial reinsurance are:

- (1) No implicit discounting or deductions, with strict limits on the scope for discounting explicitly for the time value of money.
- (2) Values placed on reinsurance must be separately identified; gross assets and liabilities must be shown, not just figures net of 'reinsurance figures'.
- (3) "The amount of technical reserves must at all times be such that an undertaking can meet any liabilities arising out of insurance contracts as far as can reasonably be foreseen." The precise interpretation of this requirement (Article 56 of the Directive) is not clear.
- (4) "Provisions for liabilities and charges may not exceed in amount the sums which are necessary." This requirement of Article 42, Fourth Accounts Directive, will also apply to insurance enterprises following implementation of the E.C. Accounts Directive.

There are other parts of the legislation which might be held to be relevant. Application of the directive may possibly necessitate some amendments to existing U.K. accounting practices.

7.3 In the U.K., there is a Statement of Recommended Practice (SORP), Accounting for Insurance Business, issued by the Association of British Insurers (ABI) and franked by the Accounting Standards Committee (ASC) in 1990. The SORP is intended to represent current best practice, but adoption of its recommendations is not mandatory.

7.4 Paragraph 120 of the SORP reads as follows: "Reinsurance arrangements, where the amount of risk transferred is not significant, should be accounted for having regard to their economic substance. Sufficient disclosure should be made in the financial statements to enable the nature and financial effect of the arrangements to be understood." The SORP does not attempt to define risk transfer. However, the U.K. accounting profession is currently working on guidance for its members.

7.5 Exposure Draft 49, entitled "Reflecting the substance of transactions in assets or liabilities", was issued by the Accounting Standards Committee in May 1990, in response to widespread concern about financial engineering in a number of industries. The overall objective is to discourage any accounting treatment which obfuscates the true nature of transactions. The document takes a general approach, requiring analysis of the substance of transactions by reference to the essential characteristics of assets and liabilities.

7.6 The Statement of Standard Accounting Practice SSAP2, which has been in existence for some time, includes discussion of two fundamental accounting concepts, the accruals concept and the prudence concept. The accruals concept requires a matching of revenue and costs as far as their relationship can be established "... and dealt with in the profit and loss account of the period to which they relate". The prudence concept requires that "provision is made for all known liabilities whether the amount is known with certainty or is a best estimate". The view has been expressed that many financial reinsurance products are used in such a way as to transgress one or both of these fundamental concepts.

7.7 Consideration of SSAP2 and the fundamental accounting concepts covered therein raises questions as to the accounting treatment which has been given in the past to many financial reinsurance contracts.

7.8 Lloyd's has, by way of response to spread loss policies, reiterated the principle that all transactions at Lloyd's should be equitable as between different groups of Names. Names are grouped together in syndicates, each year's trading being on the basis of a different syndicate and different group of Names. Lloyd's has emphasised that an underwriter cannot bind Names on future years of account for stamps (syndicates, constitutions) which do not exist, and that there must, for all reinsurance contracts, be a genuine and material transfer of risk. As yet, however, there is no definition of material transfer of risk.

7.9 The DTI has written three letters to insurance companies. These letters are reproduced in Appendix A and can be summarised as follows:

- (1) The first letter provides guidance about how discounting should be disclosed in DTI returns, indicates that implicit discounting is unacceptable and expresses concern about the disclosure implications of financial reinsurance.
- (2) The second letter specifically concerns spread loss contracts, and makes it clear that the DTI believes that to fail to recognise liabilities under these contracts, which would crystallise on non-renewal or cancellation, is contrary to existing regulations.

- (3) The third letter reminds companies of the first two, refers to the work being done by the accounting profession, and insists on full disclosure of financial reinsurance contracts. In particular it states that there should be "no possibility that a user of the (DTI) return could be confused as to the true financial position of the company".

7.10 The U.S. Financial Accounting Standards Board (FASB) exposure draft dated 30 March 1992, "Accounting and reporting for reinsurance of short-duration and long-duration contracts":

- (1) Applies to all reinsurance bought after proposals come into effect (first financial year beginning after 15 December 1992).
- (2) Requires all reinsurance recoverables to be treated as assets—no netting off unless the liability to the policyholder is extinguished; in this case the reinsurance would be a full transfer of liability with policyholder consent if appropriate.
- (3) Demands that all retrospective contracts, whatever the degree of risk transfer, must not result in immediate recognition of gains or losses as at the date of purchase. The only exception is the extinguishing of the liability as in (2).
- (4) Requires that, to the extent that a reinsurance contract does not, despite its form, provide for indemnification of the ceding enterprise by the reinsurer against loss or liability, the premium paid, less that element of the premium to be retained by the reinsurer, shall be accounted for as a deposit by the selling enterprise. A net credit resulting from the contract shall be reported as a liability by the reinsurer. A net charge resulting from the contract shall be reported as an asset by the reinsurer.
- (5) Requires that reinsurance contracts containing both prospective and retroactive provisions undergo separate evaluation of those provisions to determine whether each provision indemnifies the ceding enterprise against loss. Contract amounts shall be allocated to the prospective and retroactive provisions, and those provisions shall be accounted for separately.

7.11 The FASB exposure draft has now gone into force on 15 December 1992 with very little modification. More recently, FASB has stated clearly that the spread loss contract must lead to a full increase in reserves to cover the pay-back involved, in cases where losses have occurred. It is possible that, as a result, several companies in the U.S.A. will have to restate their 1992 balance sheets.

8. UNDERWRITING AND RESERVING CONSIDERATIONS FOR THE REINSURER

8.1.1 Although the main focus of this paper is not the viewpoint and interests of the financial reinsurer, this section and part of Section 9 consider various issues from the viewpoint of the reinsurer who sells financial reinsurance. Most such reinsurers employ the services of actuaries, and it is essential that the

contracts, which are almost always large, be fully analysed, and all the implications thereof be taken into account.

8.1.2 In general terms, there is much in common in the underwriting of traditional treaty reinsurance and financial reinsurance. The major difference arises in the detailed analysis of the information and the financial modelling of the various financial reinsurance structures. A typical financial reinsurance structure may take several weeks to develop and implement, and the more complex might take several months. At the other end of the financial reinsurance spectrum, a time and distance policy would take very little time once the payment schedule has been determined.

8.2 Cedant's Accounting and Regulatory Environment

Having identified the cedant's financial objectives, it is necessary to ensure that the reinsurance contract drafted takes account of appropriate accounting and regulatory implications. Each geographical region will have its own requirements, and it is important to seek expert advice as to the treatment of specific types of financial reinsurance structures. In this regard the cedant's auditors will often provide valuable input, and it is important to ensure that the accounting treatment will not frustrate the purpose of the contract.

8.3 Information Requirement

8.3.1 If a suitable structure has been developed and the financial issues have been resolved, then the next stage is to consider the types of risks covered by the contract and obtain relevant information to assess the levels and variability of the risk factors. Apart from the more obvious risk factors (such as claim frequency, severity and payout patterns), it may be necessary to obtain information to assess the credit risk (when the contract result is dependent on the future profitability of the cedant), and, where covered, sufficient information to assess the bad debt exposure arising from the cedant's other reinsurances enuring to the benefit of the current contract. The following is a list of the type of underwriting information typically required by financial reinsurance underwriters:

- (1) Published accounts for the past 3–5 years.
- (2) Premium and loss triangulations at a suitable level of detail to allow proper analysis of the claim process and changes in exposure.
- (3) Any actuarial reviews or internal reports relevant to the understanding of risk assumed by the reinsurer, e.g. review of large claims, investigation of pollution exposures, review of reinsurance security.
- (4) Business plan over the relevant period, e.g. for a prospective multi-year stop loss policy it would be necessary to have a clear understanding of the planned development of the account.
- (5) Complete picture of the reinsurance protections in place and the extent to which coverage has been exhausted and the amount remaining.

- (6) Underwriters' comments on business development over the past (including types of risks, changes in premium rating, changes in line size and retention, significant changes in procedures/systems/personnel/underwriting philosophy). This can assist in understanding the nature of the underlying risks and help with the assessment of the parameters used in the modelling of the financial reinsurance structure. For prospective contracts it is always useful to obtain the underwriters' view of the future.

8.3.2 The above list is not exhaustive, and the circumstances of each deal will dictate any special investigations required to assess the various risks. In addition, it must be appreciated that there are important qualitative considerations regarding the cedant, and these can be developed through general experience and detailed discussions with the cedant.

8.4 Analysis of Information

The next stage is to analyse the information in sufficient detail to understand the underlying risks and to develop estimates of the various parameters which will have an effect on the reinsurer's position. Frequently, the most sensitive parameters are the ultimate claims, claim payout pattern and future investment returns. For prospective multi-year contracts, the mix of business by class and overall profitability of the cedant can have a significant effect on the reinsurer's position. It is important to employ the relevant expertise to analyse the various types of risks within the structure. The assessment of ultimate claims and payout pattern can be made by using actuarial and statistical techniques. Suitable investment assumptions can be developed from the study of market conditions, reinsurer's investment policy and considerations of the contract terms (this is important where the contract allows for an experience account to be established with an interest credit at a rate linked to some market instrument). Credit risk assessment would require a detailed study of the financial statements, information from rating agencies and macro-economic considerations. If exposure to bad debt is assumed, then a detailed review of each reinsurer will be necessary, along with existing levels of recognition of bad debts by the cedant.

8.5 For a prospective contract, the reinsurer may require covenants as to the nature of the business to be written, and his consent may be required for changes to be made.

8.6 Modelling and Profitability Analyses

Financial reinsurance contracts tend to be complicated in nature, and it is not always obvious how the various parameters interact in producing the reinsurer's profit/loss profile. In order to assess the results of various scenarios and carry out a profitability analysis of the structure it may be essential to develop a computer model. The model should be sufficiently detailed to allow all the variables to be tested. Furthermore, the model should also allow one to demonstrate the benefits to the buyer. The underwriter will have developed profitability measures, and

will need to consider how the structure/pricing needs to be adjusted to meet the reinsurer's objectives. It is common to consider return on premium and return on capital type measures and review the sensitivity of the structure under various assumptions.

8.7 Other Considerations

<i>Expenses</i>	Financial reinsurance contracts tend to run over a number of years, and the expense loading must be adequate to cover both the initial expenses and the administrative costs over the expected duration of the contract. The level of involvement in the claim settlement process and the frequency of settlements will have a direct bearing upon these expenses. In addition, the size and source will influence expense levels.
<i>Portfolio balance</i>	As with the traditional reinsurance, the underwriter has to consider how each contract fits in with the overall book of business and consider issues such as aggregation. For reinsurance of Lloyd's syndicates it is important to note that each year is a separate legal entity, and any structure must be equitable between different sets of Names.
<i>Contract wording</i>	The underwriter has to seek legal opinion in order to ensure that the contract achieves the desired objectives.

8.8 Calculating Long-Term Expected Reinsurance Premiums

Estimating these premiums can be attempted by modelling the losses to which the reinsurance responds. This is not necessarily easy or precise. Clearly it is an area for the exercise of both judgement and actuarial techniques. For a property catastrophe account, this could be done by listing the known catastrophe risks to which the cover is expected to respond, estimating/guessing return periods for the events and then estimating/guessing severity distributions for the individual losses—if the stretch of the cover is sufficient to warrant doing so. For liability aggregate covers, models of probability distributions for both frequency and severity or total losses would need to be obtained. Once this has been done a Monte Carlo simulation can be performed, using the contract terms to estimate the expected long-term average cost (Rate on Line) for the contract. In some spread loss contracts it is the premium that varies consequent to losses, for others it is the amount of coverage for a fixed premium. Either way, the profit or loss on the contract varies with loss experience. Depending on the exposures to which the cover is subject, it may be appropriate to reassess the frequency and severity parameters each year. If we consider a cover exposed to U.S. Windstorms over \$3bn insured loss, it may well be appropriate to use an (inflation adjusted), say 15-year moving average for frequency, so that the cost responds to changes in loss frequency, albeit in a smoothed way. The cost of reinsurance charged would then reflect the underlying changes in loss frequency.

8.9 Level of Reserves to be set for a Reinsurer

8.9.1 The crucial factor is the nature and extent of risk transfer involved.

8.9.2.1 If the sole risk transfer lies in the rate of interest used in a time and distance type policy, there may still be a requirement for some small amount of reserve covering the possibility that it may not prove possible to meet the rate of investment income pre-supposed in the contracts written, particularly from:

- (a) maturing dates mismatching,
- (b) reinvestment of investment income, and
- (c) any future imposition of taxes not currently envisaged.

8.9.2.2 Current market conditions are pressing reinsurers to use higher and higher rates of interest, closer and closer to rates actually obtainable in the money market. The reinsurer may be holding equities and/or property in order to boost investment income. If such investments are derived from the capital then no great danger exists, but if any part of it is derived from reinsurance funds, possibly covering a large variety of contracts, then caution demands that a reserve be set up.

8.9.3 Once a timing risk is involved, the considerations set out in § 4.5.2 for the cedant office apply *pari passu* to the reinsurer, to the extent to which the timing risk is passed across. Such considerations may apply to almost any of the types of financial reinsurance described in Sections 4, 5 and 6. It becomes necessary to look at the pattern: to speed it up to 10% or 20% and to slow it down to see what happens.

8.9.4 In the case of a spread loss type contract:

- (a) Where no claim affecting the layer has occurred to date, then considerations of the type mentioned in Section 6.8.2 apply. There is resultant liability to the cedant.
- (b) Where a claim or claims have occurred and a pay-back is involved, then credit can validly be taken for future receipts of the pay-back amount as measured by the 'fund' set up, but with additional considerations:
 - (1) the terms that apply if either party cancels the contract, voluntarily or through insolvency,
 - (2) particularly for a high-level reinsurance, the possibility that there will be no claim in the next year, or next few years, and the resulting loss of reinsurance premiums for those years which go towards reducing the amount of the pay-back,
 - (3) the loss of interest until pay-back occurs, and
 - (4) a possible bad debt arising from the insolvency of the reinsured.

8.9.5 Once a risk transfer of claim amount, partial or full, exists in regard to the layer reinsured, then the reserving calculations must stem from the details and limits applying to the risk transfer. It becomes necessary to start from the basis of conventional reserving methods applied to the layer reinsured, the nature

of that layer and the losses advised to date, within the totality of the portfolio of business written by the reinsured. To be taken into particular account in this regard is the fact that, effectively, it is retrocession reinsurance to the reinsurer that is involved, that there is considerable danger of losses known to the cedant, but not yet breaching his excess point of reinsurance, or where claims advised to the cedant by several primary insurers reinsured have not yet in total breached the excess point of the financial reinsurance under consideration. Retrocession reinsurance on an excess loss basis always involves hidden dangers.

9. CONCLUSIONS

9.1 This paper was written in response to concerns that the issues raised by financial reinsurance had not been sufficiently debated or understood within the actuarial profession. Concerns have been expressed about the accounting and provisioning treatments of these policies, and the fact that such accounting may act against the spirit (and possibly against the letter) of the regulatory framework. There is also expressed the concern that they represent a professional risk for actuaries working in general insurance who do not understand the nature of such contracts sufficiently clearly.

9.2 The paper attempts to explain what financial reinsurance is and how it might work. The concerns mentioned in §9.1 appear, on the whole, to be justified, but it is the abuse or lack of understanding of financial reinsurance, together with an absence of clear principles governing the reserving process, that is unsound; not financial reinsurance *per se*. A similar lack of clear principles can also lead to abuses taking place in the case of conventional reinsurance; for example, the use of LMX 'spiral' reinsurance without adequate claims provision.

9.3 In Daykin *et al.*, the authors described weaknesses in the traditional balance sheet concept as a way of describing the true financial strength of a general insurance company. It is suggested that there may have been even more weaknesses than they identified. The conclusions have been reached as by-products of trying to understand how financial reinsurance works. The weaknesses of balance sheets as a means to convey information formed a principal theme of Daykin *et al.*; this consideration of financial reinsurance and reinsurance reserving generally has led to the conclusion that their message is even more valid today, with commercial pressures on management leading to balance sheets which can be, if anything, even less meaningful than they were.

9.4 The balance sheet, as conventionally compiled, can fail to deliver its implied promise of a 'best estimate picture, possibly with some margins of caution' if there is significant reliance on non-proportional reinsurance, with a significant uncertainty in the ultimate amounts recoverable under the terms of such reinsurance. This phenomenon is particularly important with whole account covers, which are perhaps more common in the London Market than elsewhere, and are often bought in the form of financial reinsurance.

9.5 It is easy to demonstrate that this problem can occur if the balance sheet

credit, taken in respect of a non-proportional policy, is set, not as a best estimate in itself, but instead is derived from the best estimate figure for the provisioning net of the reinsurance concerned. This simplistic approach to reinsurance provisioning is the commonly-adopted approach in the industry. It can be unsound.

9.6 The most blatant breach of the spirit of the accounting framework is by spread loss policies, which are taken by some as justification for not recognising certain assets or liabilities, thus putting them off the balance sheet. The DTI has acted against such an accounting treatment for these policies, emphasising its concern that liabilities should not be taken off the balance sheet.

9.7 Many financial reinsurance policies of the time and distance type are bought to make the balance sheet look stronger by taking implicit margins out of the provisions, potentially to the extent that the implicit margins become negative. That this is possible is due to the combined practices of not recognising the time value of money, of not ensuring that the values placed on reinsurance assets are consistent with the values placed on the corresponding gross liabilities and of not recognising some of the liabilities (see § 9.6). Current practice (i.e. prior to implementation of the Insurance Accounts Directive) frequently relies on future investment income to cover various unquantified costs such as future expenses relating to past policies and fluctuations in future claims costs. To the extent that any reinsurance policy 'enhances' the balance sheet immediately upon purchase, it may have a financial reinsurance element.

9.8 The approach developed in the U.S.A. by the FASB in respect of all policies bought to cover past liabilities, appears extremely effective, if perhaps somewhat too rigid. No acceleration (or reduction) in profit is allowed to be recognised as at date of purchase of a retrospective reinsurance policy; gains in respect of policies bought to cover past losses are to be recognised over the settlement periods of the policies, not on an occurrence basis. In other respects, the latest U.S. proposals have some shortcomings, and it is considered that all the balance sheet effects of financial insurance contracts should be dealt with when establishing technical reserves. The FASB approach, of establishing 'deposits' in the balance sheet, to reflect any financial elements of reinsurance contracts, is not considered to be the best way of handling the problem.

9.9 It is recognised that much more is needed to obtain consistency of balance sheet reporting from insurer to insurer. Short of some sort of professional reporting by individuals who have a thorough knowledge of the business written, it is difficult to see how observers can be confident that the balance sheet of an insurer is a realistic starting point for judging its financial strength, whether from the viewpoint of policyholder, regulator, shareholder or management.

9.10 It is, therefore, felt that the actuarial professional attitudes should play a part in the discussions of accounting standards for insurers. They should be represented on the FASB in respect of insurance issues. The actuarial profession should also take note that, when giving advice on general insurance, its members should be fully aware of the professional risks that financial reinsurance may

pose. Some amendment to the profession's existing general insurance guidance note GN12 is needed to take full consideration of these new and complex contracts.

9.11 The introduction of any new accounting guidelines will inevitably lead reinsurers to design contracts even more complicated and abstruse. Management, accountants and actuaries will have to be even more on their guard to spot emerging developments.

9.12 Part of the answer to the problems besetting the reinsurance industry would be the carrying of substantial equalisation reserves, adequate to the nature of the portfolio of insurance underwritten. It is fortunate that the Treasury has seen the strength of the need for such a reserve. Consultation is now taking place through the publication of a White Paper, prior to precise decisions being arrived at for transfer free of tax.

9.13 London Market offices specialising in catastrophe underwriting will need to move towards a basis of carrying substantial reserves in enhancement of capital, and to realise reserves only gradually when deemed appropriate. Unfortunately, such a structure raises difficulties for Lloyd's syndicates with their requirement of an equitable reinsurance to close at each year-end. In the case of catastrophe reinsurance, a time-frame of one year raises particular difficulties and the additional reserves must be held at Names level.

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APPENDIX A

**THREE LETTERS SETTING OUT
REGULATORY REQUIREMENTS IN THE UNITED KINGDOM**



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Our ref
Your ref
Date 15 April 1991

Dear

**DTI RETURNS: DISCOUNTING OF CLAIMS AND RELATED PROVISIONS BY
COMPANIES WRITING GENERAL INSURANCE BUSINESS**

This letter offers guidance to all companies reporting outstanding general business liabilities in Returns submitted to the Secretary of State under the Insurance Companies Act 1982. It concerns the accounting practice which the Department considers appropriate where companies choose to discount such liabilities to take account of any difference between the estimated ultimate settlement cost of claims and the amount which it is considered necessary to set aside now to meet those costs. There is a danger that unless full disclosure of any discounting practice is made, a company's financial position, as reported in the DTI return, will be distorted and it will be difficult for the Department to exercise effective supervision without seeking substantial additional information.

The Department is considering whether any changes should be introduced in the format of the Returns to allow the effects of discounting to be shown more clearly. For the present, while discounting is permitted under the regulations made under the Act (the Accounts and Statements Regulations 1981), its application and disclosure must be consistent with the general principle that liabilities in the Returns must be calculated in accordance with accepted accounting practice.

The Statement of Recommended Practice (SORP), Accounting for Insurance Business, issued by the Association of British Insurers (ABI) and franked by the Accounting Standards Committee in May 1990 is intended to represent current best practice. Copies are available, from the ABI, 10/15 Queen Street, London EC4 1TT. Your attention is drawn in particular to the following paragraphs.

- 124 Implicit discounting (i.e. an accounting practice which places a present day value on an outstanding claims provision without disclosure of that fact) is not acceptable. Explicit discounting of provisions for outstanding claims is acceptable if a satisfactory estimate of the amount of the liability can be made and there is adequate past experience on which a reasonable model of the timing of the run-off of the liability can be constructed. It is for the insurance enterprise to decide whether or not it is appropriate to discount. Where claims provisions are discounted, the related reinsurance recoveries should also be discounted.
- 125 The rate used for discounting claims liabilities should not exceed a conservative estimate of the rate of investment income which the enterprise considers is most likely to be earned on its investment portfolio over the term during which the claims are to be settled.
- 126 The accounting policy adopted for any discounting of provisions for claims outstanding and direct claims handling expenses should be disclosed in the financial statements. In particular, disclosure should be made of:
 - the classes of groupings of business involved;
 - the methods applied, including:
 - the range of discount rates used;
 - the mean term of the liabilities;
 - the treatment of the attributable investment income;
 - the effect of discounting on the profit or loss before taxation for the accounting period and on the net assets at the end of the accounting period.
- 127 If an enterprise alters its accounting policy for providing outstanding claims from a non-discounted basis to a discounted basis or from a discounted basis to a non-discounted basis, the change should be dealt with as a prior year adjustment in accordance with the requirements of SSAP6.
- 131 The accounting policy adopted in assessing the requirement for an unexpired risks provision, and whether investment income has been taken into account, should be disclosed together with the amount of the unexpired risks provision and changes in the amount of the provisions from one accounting period to the next.

FINANCIAL REINSURANCE

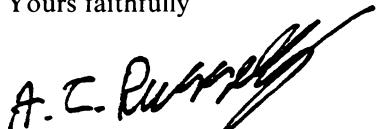
The Department has noted the increasing use of "financial reinsurance" where the risk transfer element is small and where the purpose of the transaction is often

to allow for the recognition of a greater surplus, or the reporting of a lower level of liabilities, than would otherwise be possible. In practice such transactions are frequently seen as an alternative to discounting. The Department will consider whether, in the light of the further development of such reinsurance arrangements, additional guidance would be desirable on how this type of transaction should be reported in the DTI returns. Meanwhile you should note that this subject is covered by paragraph 120 of the ABI SORP:

- 120 Reinsurance arrangements, where the amount of risk transferred is not significant, should be accounted for having regard to their economic substance. Sufficient disclosure should be made in the financial statements to enable the nature and the financial effect of the arrangements to be understood.

I should be grateful if you would ensure that this latter is seen by all those, including your company's auditors, who are involved in, or have responsibility for, the preparation and submission of your Returns to the Secretary of State.

Yours faithfully



A C RUSSELL
ROOM 723
HEAD, INSURANCE DIVISION



To the Secretary of every company
authorised to carry on general
business insurance within the UK

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Our ref

Your ref

Date 22 June 1992

Dear Sir

**INSURANCE COMPANIES ACT 1982 (THE ACT); RETURNS MADE UNDER
THE PROVISIONS OF SECTION 17**

RECORDING OF LIABILITIES UNDER CONTRACTS OF REINSURANCE

1. SPREAD LOSS POLICIES

The Department has become aware of the growth in the practice of companies purchasing reinsurance by means of a "Spread Loss" or "Prospective Aggregate" contract. The contract may be described by other nomenclature but will partake of the following characteristics.

- (a) Cover is provided on a non proportional basis.
- (b) The reinsurer provides a contract on a continuous basis. This continuity is achieved by the maintenance of a technical account which records the performance of the contract from inception, with the closing balance affecting the contractual rights of future periods.
- (c) Any costs or claims paid will be recovered from the reinsured, via the technical account. Any deficit in this account will be recovered from future premiums.
- (d) Interest may be credited on technical account favourable balances, and charged on adverse balances.
- (e) On cancellation, any deficit in the technical account will be made good by the reinsured, any excess will be refunded to the reinsured, subject to the reinsurers contractual deductions. Payments will be subject to conditions which ensure the reinsurer makes a profit.

Technical Account

- (f) This account, also known, *inter alia*, as the experience account, is a

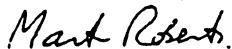
memorandum account, representing the result of the contract from inception. It is credited with the premiums paid and investment income, less contractual deductions, and is debited with the losses paid.

- (g) The reinsured may have the right to cancel the contract and recover the balance in this account. In such circumstances there may be a penalty fee to the reinsurer.
- (h) The contract may be part of a programme, with the technical accounts of a low level layer and of a higher level layer linked.

2. RECOGNITION OF LIABILITIES UNDER A SPREAD LOSS POLICY

- (a) Where the company which has purchased a spread loss policy makes a claim under that policy the effect upon the technical account balance must be considered.
- (b) Where the technical account shows an adverse balance due by the company, which balance must be paid to the reinsurer under the terms of the contract, then this clearly represents a liability which, in accordance with Regulation 52(2) of The Insurance Companies Regulations 1981, must be recognized in returns made under the Act.

Yours faithfully



MARTIN ROBERTS
INSURANCE DIVISION 2
ROOM 812



To the Chief Executive of every company authorised to carry on general business insurance within the UK

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Our ref

Your ref

Date December 23, 1992

Dear Sir

RETURNS MADE PURSUANT TO SECTION 17 OF THE INSURANCE COMPANIES ACT 1982 ("DTI RETURNS")

The Department is aware that many companies have purchased, or are considering purchasing reinsurance that comes under the broad description of 'Financial reinsurance'. This letter offers guidance to all companies on the disclosure of such reinsurance in DTI returns.

The Department does not wish the reported positions of companies to be distorted by a range of treatments in the DTI Returns, or to have to request significant additional information to enable it to perform its supervisory task effectively. Whilst recognising that disclosure can never be a substitute for correct accounting treatment, the Department considers that guidance on disclosure is urgently required for the purposes of the 1992 DTI Returns.

The Department is aware that the Institute of Chartered Accountants in England and Wales are developing recommendations for the accounting treatment of reinsurance contracts within financial statements prepared in accordance with the Companies Acts, and this letter in no way attempts to pre-empt this process. When the final recommendations are available the Department will consider whether the present guidance should be amended.

This letter should be read in conjunction with the market letters dated April 15, 1991 from Mr Russell and June 22, 1992 from Mr Roberts which provide advice on closely related topics.

DEFINITION OF FINANCIAL REINSURANCE

Financial reinsurance may take various, often complex, forms, and comes

under a range of names, including “Finite Risk Insurance”. It may, however, generally be distinguished by some or all of the following characteristics:

- i Premiums, commissions or commutation arrangements depend, or depend in part, on the timing and amount of claims payments;
- ii Premiums are set allowing for explicit discounting of claims to allow for the time value of money;
- iii The financial outcome, including the effect on the profit of both parties, can be predicted with some certainty at the outset;
- iv Recoveries are not directly linked to underlying claims settlements.

Despite discussion documents, and other accounting guidance issued by ICAEW, AICPA in the USA, and the ABI in the SORP, no single comprehensive definition of Financial Reinsurance has yet been devised. The Department does not consider that a prescriptive definition is required for the purpose of this guidance; advice in specific cases can be sought from your professional advisers or the Department as necessary.

However, for the avoidance of doubt, you should note that it is the opinion of the Department that arrangements that only provide cover for the timing risk, as to the settlement pattern of claims, and do not cover the underwriting risk, as to the amount and existence of claims, may nonetheless constitute reinsurance.

DISCLOSURE OF FINANCIAL REINSURANCE

Proper presentation and disclosure will aid a user of the DTI Return to assess the position of a company. The effect of Financial Reinsurance contracts should be disclosed in adequate detail to ensure that the relationship between the assets, liabilities, premiums, claims and investment income are accurately reported, and not distorted by inappropriate treatment or inadequate disclosure of the contracts concerned. The following treatment should be adopted:

- i the revenue account information, including all run-off data, should not be affected by the existence of such contracts;
- ii the insurance liabilities in the balance sheet should be suitably analysed to show the effect of such contracts. Where accounted for as reinsurance the full effect of these contracts on the balance sheet of the company should be shown on Line 29 of Form 15 or disclosed as appropriate on Form 13.
- iii there is no possibility that a user of the return could be confused as to the true position of the company. This includes the assessment of the closing financial position and the determination of solvency requirements.
- iv Disclosure under Regulation 17 to 19 of the Insurance Companies (Accounts and Statements) Regulations 1983, should include Financial Reinsurances.

In certain circumstances it may be apparent that a reinsurance policy includes real risk transfer as well as a financial product. The Department considers that it would be appropriate to treat the two elements separately. We appreciate that

this division may be difficult, and it will clearly involve the application of judgement.

We request you to draw the contents of this letter to the attention of your auditors.

Yours faithfully,

A handwritten signature in black ink, appearing to read "J. P. Spencer".

J P SPENCER
Head Insurance Division

APPENDIX B

EXAMPLES OF FINANCIAL REINSURANCE CONTRACTS

This appendix sets out some examples to demonstrate the working of several types of financial reinsurance. It should be pointed out that many contracts have lengthy, detailed and complex wordings. However, in some cases wordings are short and leave much detail unsaid. In extreme cases there may be no separate policy document, the slip embodying the policy by means of the endorsement 'sign slip for policy'.

It is impossible to get a clear understanding of financial reinsurance without looking at a selection of wordings. There is a steep learning curve. At first it may be very difficult to understand how a contract operates, but, after a while, the various clauses and structures become more familiar, and it is much easier to identify and analyse a financial reinsurance contract. When analysing any contracts, it is helpful to consider:

- (a) the nature of the business being reinsured,
- (b) why the contract has been taken out,
- (c) how it works, including the accounting, under various contingencies, and
- (d) where the risks lie between reinsured and reinsurer.

There is no standard terminology, and the terms which we have used may be applied to other sorts of contract, just as the contracts we describe may be called by different names.

The reader who wishes to see a wider selection of wordings could consult *A Practical Guide to Financial Reinsurance*, by A. Barile, published by Executive Enterprises Publications Co Inc, New York. This book also includes examples of side agreements.

TIME AND DISTANCE (T & D) CONTRACTS

These usually provide for a structured payment schedule so that the reinsurer is exposed to no, or very little, risk if the reinsurer has to pay claims earlier than expected. The premium is often the discounted value of the payments, together with loadings.

Example 1

Contract term:	Effective from 01/01/91 until all obligations hereunder have been discharged.
Coverage:	Aggregate Excess of Loss Reinsurance. To reimburse the reinsured for ultimate net losses \$20m (in the aggregate) excess of \$10m (in the aggregate)

gate) of paid losses on or after 01/01/91 on the reinsured's U.S. liability account for underwriting years 1985 and prior.

Reinsurance premium: \$12.5m payable on or before 15/02/91.

Claim payments: The ultimate net aggregate losses paid by the reinsured during each calendar year and recoverable hereunder shall be paid to the reinsured within 15 days of receipt of loss report or on 15 February of the following year whichever is later, subject to a maximum cumulative recovery of not more than the reinsured's cumulative estimated claim payments, as follows:

Calendar year ending	Reinsured's cumulative estimated claim payments \$m
31/12/94	3.3
31/12/95	6.7
31/12/96	10.0
31/12/97	12.5
31/12/98	15.0
31/12/99	17.5
31/12/00	20.0

Outstanding claims advance clause: At 15 February 1995 and annually thereafter, the reassured may collect from reinsurers by way of OCA any balance remaining after collection of paid loss recoveries, up to and not exceeding the policy limit (being for this purpose, the reinsured's cumulative estimate claim payments at the relevant time), or the sum of noted outstanding losses plus the reassured's calculation of IBNR, whichever be the lesser at the relevant date. In the event of any subsequent reduction of such amount, the reassured shall return any surplus to the reinsurers at the following recovery date as above.

Cancellation: At sole option of the reinsured on or after 31/12/00. Within 45 days following cancellation, the reinsurer agrees to pay the reinsured a profit commission equal to 95% of the balance of the cover limit less the cumulative amount of the reinsurer's claim payments hereunder.

Analysis (T&D)

The reinsured had reserves, including IBNR, of \$30m as at 31/12/90, and

entering into this contract would produce an apparent release of surplus of \$7.5m.

The interest rate on medium-term U.S. Treasuries at 01/01/91 was approximately 8.3%. The payment schedule in the example has a present value of \$11.8m at 8.3%. The premium is \$12.5m, thus providing a possible profit to the reinsurer if interest rates remain unaltered. The gain is greater if the rate of claim payment by the reinsured is slower than anticipated in the schedule.

The contract has been entered into on the understanding that aggregate losses will exceed \$30m. If they prove to be less than \$30m, the reinsurer makes a small unexpected profit of 5% of the shortfall.

LOSS PORTFOLIO TRANSFER

Example 2

Contract term:	Effective from 01/01/91 until all obligations hereunder have been discharged.
Coverage:	Aggregate Excess of Loss Reinsurance. To reimburse the reinsured for the ultimate net losses \$20m (in the aggregate) excess of \$10m (in the aggregate) of paid losses on or after 01/01/91, on the reinsured's U.S. liability account, for underwriting years 1985 and prior.
Reinsurance premium:	\$14m payable on or before 15/02/91.
Claim payments:	The ultimate net aggregate losses paid by the reinsured during each calendar year and recoverable hereunder shall be paid to the reinsured within 15 days of receipt of loss report or on 15 February of the following year whichever is later.
Cancellation:	At sole option of the reinsured on or after 31/12/95. Within 45 days following cancellation, the reinsurer agrees to pay the reinsured a profit commission equal to 95% of the balance of the cover limit less the cumulative amount of the reinsurer's claim payments hereunder.

Analysis

The nature of the contract depends on the amount, timing and uncertainties attached to the reinsured liabilities. The reinsured had known loss reserves of \$30m as at 31/12/90. By entering into this contract there will be an apparent improvement of \$6m in the balance sheet/revenue account. The reinsured has locked in a fixed rate of return and has passed on the risk that claims may be paid earlier than expected. The deductible in the contract is intended to protect the reinsurer against a freak early surge of claims. If the ultimate claim exceeds \$30m, the reinsured will be liable for the excess. Since there is a guaranteed return

of the balance of the limit by 31/12/95 (or at least 95% if the contract is cancelled by the reinsured) the contract can be regarded as having a current value of at least the present value of any unclaimed balance. If there is little likelihood of claims being payable before 31/12/95, this contract is close in substance to a time and distance policy.

The provision that recoveries will be made only once a year, within 15 days of 15 February, occurs in many of the examples we quote. Obviously, it gives a margin to the reinsurer and should be taken into account in any financial assessment by either party. It is possible, however, that the major reason for its inclusion is to reduce the administration. Otherwise there might be a continual flow of paper between reinsurer and reinsured once the excess point has been reached. On the other hand, annual settlement seems to be a common feature of financial reinsurance, as compared with conventional reinsurance which settles more frequently.

If the reinsured's loss reserves as at 31/12/90 had been only \$10m then, depending on the likelihood of deterioration of these reserves, the contract might be thought of as a rollover. A rollover effect could be achieved by not recognising the asset value of a guaranteed recovery at 31/12/95.

Example 3 (which will be specified as covering the whole account or specific classes)

Contract term:	Effective from 01/01/91 until all obligations hereunder have been discharged.
Coverage:	Aggregate Excess of Loss Reinsurance To indemnify the reinsured for all losses or liability, in respect of the 1983 to 1988 underwriting years of account which are paid on or after 01/01/91, subject however to the following terms and conditions:
Original limit:	U.S.\$40,000,000 in the aggregate.
Original retention:	U.S.\$150,000,000 in the aggregate.
Limit adjustment:	On or before 15 May immediately following calendar years 1991 to 2005 (commencing 15 May 1992), the actual cumulative paid losses are compared to the target cumulative losses for the purpose of calculating the limit for the prior calendar year. The original limit is adjusted for calendar years 1991 to 2005 inclusive as the greatest of the following: (a) (original limit + $(A \times B)$) for the calendar year just completed, (b) (original limit + $(A \times B)$) for all prior calendar years commencing in 1991, and (c) $A =$ the adjusted duration less 11 years $B =$ U.S.\$1,000,000.

Notwithstanding the above, the reinsurer's aggregate limit of liability under this agreement shall never be less than U.S.\$40,000,000 unless mutually agreed in writing by both the reinsurer and reinsured.

Retention adjustment: On or before 15 May immediately following the end of calendar years 1991 to 1997 inclusive (commencing 15 May 1992), the retention is calculated as the greatest of the following:

- (a) original retention + $x\%$ of (actual cumulative paid loss – target cumulative paid loss), for the calendar year just completed,
- (b) original retention + $x\%$ of (actual cumulative paid loss – target cumulative paid loss), for all prior calendar years commencing in 1991, and
- (c) original retention.

Premium: U.S.\$***** payable on or before 28/02/92.

Ultimate net loss: The term 'ultimate net loss' shall mean all sums paid by the reinsured (including any appropriate extra contractual obligations as defined herein) after making deductions for all recoveries, under any other reinsurance(s) except the reinsured's so-called time and distance reinsurances, as defined herein. It is understood and agreed that where the reinsured is unable to make recoveries under other reinsurances due to the insolvency of reinsurer(s), then such amounts shall be deemed recovered for the purposes of this reinsurance.

Reports and accounts: Within 120 days following the end of each calendar year during the term of this agreement, the reinsured shall report in writing to the reinsurer providing a summary of the following:

- (a) the amount of losses and allocated loss expenses paid by the reinsured during the calendar year, split by class;
- (b) the amount of losses and loss expenses outstanding as at the end of the calendar year, split by class.

Such reports shall provide this information separately by year of account and in the aggregate for all years of account.

Loss settlements: The ultimate net loss paid by the reinsured during each calendar year ending 31 December and recoverable hereunder shall be paid to the reinsured by the reinsurer

within 15 days of receipt of the loss report or after 1 May of the following calendar year, whichever is later.

Incurred loss:

Subject to the terms of this reinsurance, the reinsured is able to incur all losses up to the limit of this reinsurance with effect from 01/01/91.

Definitions:

Actual cumulative paid loss is defined as cumulative paid losses to this contract with effect from 01/01/91.

Target cumulative paid loss is defined as an amount in millions of U.S.\$ for each calendar year.

(1)	(2)	(3)
Calendar year	Annual target paid loss	Target cumulative paid loss
1991	5	5
1992	30	35
1993	25	60
1994	20	80
1995	20	100
1996	15	115
1997	13	128
1998	12	140
1999	10	150
2000	10	160
2001	9	169
2002	8	177
2003	6	183
2004	4	187
2005	3	190
		190

Adjusted duration is defined as C/D , where:

$C = \text{Sum of } (T+0.5 - 1991) * P_T$
for all values of T from 1991 to 2010

$D = \text{Sum of } P_T$
for all values of T from 1991 to 2010 where

$T = \text{Calendar year for which the limit is being calculated, e.g. for calendar year 1992, } T=1992$

$P_T = \text{Reinsurer's revised projected payment in calendar year } T$.

Reinsurer's revised projected payments are calculated as follows:

- (1) The annual paid target losses are replaced with the

actual annual paid losses for each year up to and including calendar year T .

- (2) The difference between the target cumulative paid loss and the cumulative actual paid loss is divided equally between the calendar years 2006 to 2010 inclusive.
- (3) The revised cumulative paid losses are calculated from the combined actual and target paid losses.
- (4) The reinsurer's revised cumulative projected paid losses are the positive differences (if any) between the revised cumulative paid losses and the retentions thereon. The maximum limit *for this purpose* is the original limit of U.S.\$40,000,000.

The difference between the successive values of reinsurer's revised *cumulative* projected paid losses is equal to the reinsurer's projected paid losses, i.e. P_T series.

Comments

This appears to be a very complicated contract, and must be read a number of times to obtain an understanding of how it works. The contract is not easy to understand and this example has been included specifically to emphasise the complexity of some of the contracts in use.

The outcome will depend on the nature and volume of business being reinsured. The implication of the particular use of the term 'incurred loss' is not clear, and perhaps requires further explanation and confirmation.

To obtain an understanding of the working of this contract, it is necessary to work through a number of examples of possible claim settlement patterns of the reinsured and to see how the reinsurance contract reacts to each in turn.

SPREAD LOSS CONTRACTS

Example 4

Contract term:

Effective from 01/01/91 until all obligations hereunder have been discharged.

Coverage:

Aggregate Excess of Loss Reinsurance

To reimburse the reinsured for the ultimate net losses \$20m (in the aggregate) excess of \$2m (in the aggregate) of paid losses on or after 01/01/91, on the reinsured's U.S. professional indemnity account, for all losses occurring from 01/01/91 to 31/12/95.

Reinsurance premium: \$3.3m payable on or before 15/02/91;

\$3.3m payable on or before 15/02/92;

\$3.3m payable on or before 15/02/93;

\$3·3m payable on or before 15/02/94;
\$3·3m payable on or before 15/02/95.

Claim payments:	The ultimate net aggregate losses paid by the reinsured during each calendar year and recoverable hereunder shall be paid to the reinsured within 15 days of receipt of loss report or on February 15 of the following year whichever is later.
Cancellation:	At sole option of the reinsured on or after 31/12/95. Within 45 days following cancellation, the reinsurer agrees to pay the reinsured a profit commission equal to 95% of the balance of the cover limit less the cumulative amount of the reinsurer's claim payments hereunder.
Termination:	In the event that the reinsured shall fail to pay any premium due, the reinsurer shall have the sole right to terminate the agreement with effect from inception, when the reinsurer shall return all premiums paid less any claims paid.

Analysis

The writing of this contract will depend on the nature and volume of business written by the reinsured, and there may well be covenants in this regard.

For the contract to be effective for the reinsured, it has to be possible to account for the premium as a reinsurance premium, allowable for tax, in the year in which it is paid; and to account for a recovery in the year in which the inward loss occurs/the profit commission becomes due.

From the point of view of the reinsurer, it is likely that there will be a delay before any claims have to be paid, so that there will be interest earnings on the accumulated premiums; \$3·3m rolled up for 5 years at 7% p.a. gives \$20·4m.

EXPERIENCE FUNDED ACCOUNTS

These contracts are a more sophisticated version of a spread loss policy. In particular, the reinsurer is prepared to advance claims up to a fixed amount in excess of the fund of premiums held. Even if these contracts are accounted in such a way as to reduce their loss-spreading effects, they could be akin to a line of credit with a bank, set up in advance for a rainy day, albeit on expensive terms. Potential cash shortages are now more of a concern than they used to be.

Example 5

Contract term:	Effective from 01/01/91 until all obligations hereunder have been discharged.
Coverage:	Aggregate Excess of Loss Reinsurance To reimburse the reinsured for the ultimate net losses

\$5m, per occurrence, excess of \$1m, per occurrence of paid losses on or after 01/01/91, on the reinsured's U.S. professional indemnity account, for all losses occurring from 01/01/91 to 31/12/95.

Reinsurer's maximum annual aggregate liability:	Exposure fund balance at beginning of year plus \$10m.
Reinsurance premium:	\$2.5m p.a.
Exposure fund:	Charges to the fund: – claims paid for the year – interest on deficit fund balance (e.g. base + 2%). Credits to the fund: + premium for the current year + interest on positive fund balance (e.g. base – 1%).
Cancellation:	The contract may be cancelled by either party on or after 31/12/95, when the following will occur: – The reinsurer will return 100% of any positive balance of the fund to the reinsured. – The reinsured will reimburse 100% of any negative balance of the fund to the reinsured if the reinsured terminated the agreement.

Analysis

It should be pointed out that premiums are payable until cancellation; not just for 1991 to 1995. The reinsurer is exposed to having to pay claims of \$10m in addition to the fund which has been built up. This is, of course, just a credit risk, because the reinsurer will eventually be repaid. Under this example the contract may be cancelled after 5 years at the discretion of either party. Another variant permits the reinsurer to cancel only if there is a positive balance, but commits the reinsured to pay larger premiums if there is a negative balance. Such an arrangement would relieve the reinsured of the obligation to repay a negative balance at an inconvenient time, but would involve the reinsurer in a theoretically open-ended commitment, which would no doubt be taken into account in the charging structure.

Example 6

The contract is the same as in Example 5, except that on termination only 50% of the balance is payable by the relevant party.

Comment

Because there is now a significant uncertainty in the underwriting outcome, this

contract is arguably now a reinsurance policy, albeit with several complicating features, and so we would expect it to be accounted for as reinsurance, at least in part. When reserving, it would be appropriate to provide for any contractual future premiums and to make allowance for any cancellation charges that would become due from either party, if there are no (more) claims in the future. In practice, at least 80% of the balance would normally be payable, and the contract would be drawn up so that, after taking account of interest margins and other charges, the real downside to the reinsurer was minimal. At first glance, however, such a contract will look more risk bearing than it really is.

As the contract is designed to cover a number of underwriting years, it is not an appropriate contract to reinsure a Lloyd's syndicate or, indeed, any underwriting pool with variable participants.

APPENDIX C

CRITERIA FOR DETERMINING THE RELATIVE STRENGTHS OF NET AND GROSS RESERVES

C.1 This appendix suggests an approach to reserving which can be applied to all reinsurance. While the approach produces a reasonable answer for a contract which is wholly financial reinsurance, it may not produce the conventional result for conventional reinsurance contracts. It instead generates a more appropriate result because allowance is, in effect, made for any financial reinsurance element in the conventional contract and for any newer versions of financial reinsurance that may be developed in the future. It contains the germ of very useful ideas.

However, some aspects of this appendix are controversial, and may not meet with general acceptance. It is possible to set provisions on an expected value basis, and to use the type of approach described to estimate the capital required to support those provisions.

C.2 *Reinsurance Reserving Criteria*

C.2.1 A simplistic criterion would be:

“The net reserve should be set so that it exceeds the mean amount required at the date of the reserve to meet the net claims by the same amount as the gross reserve exceeds the mean gross reserve.”

This takes no account of any contribution by the reinsurance to covering the uncertainty in claim amounts.

C.2.2 A better criterion would be the following (Criterion 1):

“The net provision should be set so that the probability of the amount required at the date of the reserves to meet net claims being greater than the net reserve is the same as the probability of the amount required to meet the gross claims being greater than the gross reserve.”

This particular criterion is, of course, imperfect as, *inter alia*, it takes very little account of the distribution of the amount of the total claims figure. It is equivalent to saying that the net reserve should be sufficient to meet the same claims (and no more) as the gross reserve, but is stated in terms which draw attention to more rigorous and sophisticated, but, arguably, less practical approaches.

C.2.3 Another, perhaps more sophisticated criterion would be the following (Criterion 2):

“The net reserve should be set so that, looking at the distribution of the reserve equal to the amount required at the date of the reserve to meet the net claims, it is the same number of standard deviations away from the mean as the gross reserve is from the mean gross reserve.”

Criteria could be developed which attach specified utilities to different levels of profits and deficiencies on reserves.

C.2.4 Setting net provisions by applying a rule such as Criterion 2 could involve stochastic projections of claims, and would require an assessment in mathematical terms of the distributions of the claims. There are practical problems in this; indeed there are major problems in producing meaningful results. Many criteria are possible which might be satisfactory for this purpose. Though the precise criterion adopted is likely to have a substantial effect on the net provision, a discussion of which formulation produces the 'right' provision, for solvency or other purposes, is beyond the scope of this paper.

C.2.5 The major advantage of Criterion 1 is the limited knowledge of the distribution of claim amounts needed in order to apply the criterion. The application of this criterion is developed further in §§ C.5.1 to C.6.6.

C.3 Notation

C.3.1 The following is some shorthand notation.

C.3.2 However described, all reserves are made up of an amount E required to meet the expected level of claims, plus an amount U which is the difference between E and the actual reserve and is necessary because the actual level of claims is uncertain. Let the components E and U of the reserves be referred to as follows:

$E(g,d)$ and $U(g,d)$ for gross of reinsurance and discounted
 $E(n,d)$ and $U(n,d)$ for net of reinsurance and discounted
and replace d by u for undiscounted.

Finally, let the gross reserves be $P(g)$ and the net reserves be $P(n)$.

C.3.3 Conventionally, $P(n)$ is taken as $E(n,u)$ rather than explicitly as $[E(n,d) + U(n,d)]$. In many cases this gives a satisfactory provision, and $U(n,d)$ can be taken as equal to $E(n,u) - E(n,d)$. If reinsurance is quota share, then also $E(g,u) = E(g,d) + U(g,d)$; but if the company has accepted large risks or accumulations for which it relies on excess of loss or surplus reinsurance for safety, then one would expect that not discounting at the gross level would constitute an insufficient provision for adverse deviations; i.e. $E(g,u) < E(g,d) + U(g,d)$. Similarly if $E(g,u) < E(g,d) + U(g,d)$, and the reinsurance is predominantly financial in nature, $E(n,u) < E(n,d) + U(n,d)$, if there is to be an adequate provision for adverse deviation. Indeed, the procedure of simply providing $E(n,u)$ can be seen as the cause of many of the problems with financial reinsurance.

C.3.4 One could regard $E(g,d)$, $U(g,d)$ and $E(n,d)$ as being determined by the distribution of claim amounts, the strength at which the company sets its gross reserves and the reinsurance arrangements. The criteria in Section C.2 are then ways of determining $U(n,d)$.

Similarly, if a company has reinsurance providing less protection than desired, the criteria could be used to determine $U(g,d)$ from $E(g,d)$, $E(n',d)$ and $U(n'd)$,

where n' refers to the net position with the reinsurance protection that the company is comfortable with.

C.4 Application of Reinsurance Reserving Criteria

C.4.1 Applying the criteria would involve determining the reinsurance recovery associated with various levels of projected claims. Projected claims may have to be allocated, by numbers and amounts, to policies in order to precisely determine the total reinsurance recovery. This process is, in any case, required by current reserving techniques, but is greatly simplified for notified claims, as the number of claims and amounts paid in respect of each policy are known, though obviously it remains necessary to allocate amounts outstanding. However, the IBNR claims and claims related to the URR may have to be allocated to policies by numbers and amounts, and normally some simplifying assumptions and groupings of policies are followed, in order to determine the associated reinsurance recovery. The derivation of the reinsurance recovery in respect of projected claims requires procedures similar to those currently in use for IBNR reserves and the URR. Clearly, simulation techniques can have a role here.

C.4.2 There are considerable advantages in reporting $P(g)$ and $P(n)$, split into their components of E and U . If $P(g)$ and $P(n)$ are not split, then the nature of a company's operations and reinsurance programme is obscured compared to when they are split. For example, if a company purchases significant amounts of genuine reinsurance, one would normally expect $U(n,d)/E(n,d)$ to be less than $U(g,d)/E(g,d)$, as reinsurance is bought primarily to smooth out results, whereas the purchase of financial reinsurance would result in $U(n,d)/E(n,d)$ being greater than $U(g,d)/E(g,d)$. Obviously this information is lost if the total provision is not split. However, it is probably too big a step in the near term to expect companies and their auditors to split reserves into E and U figures.

C.4.3 If E and U figures are separately identified both figures should be discounted. E.C. legislation will not always allow discounted items to be included in shareholders' accounts, but discounted figures may be set out as supplementary information in notes to the accounts. However, the approach in §C.4.2 could still be applied in this case, if it was used merely to provide an additional minimum figure for the total net reserves.

C.4.4 If contracts are correctly interpreted (including contractual future premiums and recoveries on non-renewal of spread loss or other similar contracts) and modelled, setting all net provisions by applying Criterion 1 or 2 should succeed in tackling the financial reinsurance issue. (It is possible that other criteria would also have a satisfactory effect.) The introduction of a contract which was entirely financial reinsurance (in the sense that it changed the mean of the net reserve, but left the shape of the distribution of the net reserve unchanged) would have no effect on the U figure applicable to the net provision, say $U(n)$. A hybrid contract with minimal transfer of risk would usually have an equally minimal effect on $U(n)$. The effect of a financial reinsurance contract on the E figure for the net of reinsurance reserve, say $E(n)$, should approximate to the

purchase cost of the contract. The impact on free assets from purchasing a pure financial reinsurance contract could only arise from items such as the profit and expenses of the reinsurer and differences between the tax circumstances of the cedant and reinsurer. For hybrid contracts including a significant degree of risk transfer, the effectiveness of the procedure obviously depends on Criterion 1 or 2 or any other suitable criterion chosen not being unsuitable having regard to the loss distribution of the risk transferred (see § C.2.3).

C.4.5 This approach to setting the net reserve would have the inevitable effect, mentioned in § C.1, of not reproducing the conventional net provision for certain conventional contracts. For example, an excess of loss reinsurance where the cover was exhausted if claims reached the expected level, would normally, after applying Criterion 1 or 2, result in a larger net provision than conventionally (see § C.5.2.1). This reflects the limited nature of the protection provided by such a contract.

C.4.6 On the other hand, an excess of loss contract which paid nothing until claims reached twice the expected level, would similarly be likely to result in a substantially reduced net provision when compared to the conventional calculation (see § C.5.2.2). The conventional calculation, based on reinsurance recoveries if claims reach the expected level and no discounting, results in no reduction in the net provision following the purchase of such a contract in spite of the genuine protection provided by the contract.

C.5 Examples

C.5.1 The following are two examples of the application of Criterion 1, which illustrate the points made in §§ C.4.5 and C.4.6. In order not to complicate the examples unnecessarily, the process of allocating claims to policies and grouping policies, referred to § C4.1, has not been included. The examples refer to a single reinsurance policy and a single claim amount.

C.5.2.1 Case 1

Let, for a particular risk, $E(g,u) = 24$, $E(g,d) = 18$. The company then buys excess of loss reinsurance, for the single risk, which pays 12 excess of 12.

Conventionally we would have $P(g) = 24$, $P(n) = 12$. However, simplistically applying Criterion 1, we would say that $U(g,d) = 24 - 18 = 6$, and that we must ensure $U(n,d)$ is consistent with this figure.

Applying the same discounting factor (0.75) used for E to U , gives $U(g,u) = 6/0.75 = 8$. In other words, the gross provision was sufficient if claims reached $24 + 8 = 32$. In this case the reinsurance would still only pay 12, and the net discounted provision required to meet a claim of this size would be $0.75 \times (32 - 12) = 15$. So $E(n,d) + U(n,d) = 15$.

The new figure of 15 exceeds the conventional figure of 12, which is reasonable, as the reinsurance provides rather less protection than, for example, a 50% quota share, which would conventionally also produce a net provision of 12.

C.5.2.2 Case 2

Let, for a particular risk, $E(g,u) = 24$, $E(g,d) = 18$. The company then buys excess of loss reinsurance, for a single risk, which pays 4 excess of 24.

Conventionally we would have $P(g) = 24$, $P(n) = 24$. However, applying Criterion 1 we would say that $U(g,d) = 24 - 18 = 6$, and we must ensure that $U(n,d)$ is consistent with this figure.

Applying the same discounting factor (0.75) used for E to U , gives $U(g,u) = 6/0.75 = 8$. In other words, the gross provision was sufficient if claims reached $24 + 8 = 32$. In this case the reinsurance would pay 4 and the net discounted provision required to meet a claim of this size would be $0.75 \times (32 - 4) = 21$. So $E(n,d) + U(n,d) = 21$.

The new figure of 21 is less than the conventional figure of 24, which is reasonable as the reinsurance is of a significant value, even though it would not give rise to any recoveries at the expected level of claims.

C.5.3 Case 1 could be regarded as containing a significant element of financial reinsurance, as an element of the premium will almost always be returned as reinsurance recoveries at a later date and the product will obviously be priced to reflect this. Case 2 has no element of financial reinsurance. The degree of financial reinsurance is reflected in the relationship between the new and conventional provisions calculated above.

C.5.4 Obviously the above cases are simplified for the purpose of illustration. For example, differences between the timing of claims payments and reinsurance recoveries have not been allowed for, nor has the issue of reinsurance security been considered. It will be noted that, in both cases, the reinsurance is valued at 75% of the maximum recovery, although recovery is more likely to take place in Case 1 than in Case 2. This is a result of using Criterion 1.

The use of a figure of 75% is here being considered for a single risk. With several (not too dissimilar) risks the criterion will give results that, intuitively, are more reasonable. If a single large risk dominates the results, such as following a catastrophe which may burst a company's protection, reserve setting is more difficult and any criterion is likely to look peculiar.

C.6 Further Thoughts on Applying Criterion 1

C.6.1 Applying Criterion 1 is equivalent to the procedure described in § C.6.2, which follows what was done in Cases 1 and 2 in Section C.5.

C.6.2 Calculate a minimum net of reinsurance reserve by grossing up (for discounting) the gross of reinsurance reserve to give $E(g,u) + U(g,u)$, then reduce this figure for reinsurance (i.e. the recoveries that would be made if gross claims actually reached $E(g,u) + U(g,u)$) and then discount to give $E(n,d) + U(n,d)$.

C.6.3 The above procedure could be formalised as follows:

Note:

(1) = Mean gross of reinsurance, undiscounted reserves, $E(g,u)$ in the notation of § C.3.3.

- (2) = Mean gross of reinsurance, discounted reserves, $E(g,d)$ in the notation of § C.3.3.
 (3) = The gross of reinsurance reserves (actual) = $P(g) = E(g,d) + U(g,d)$.

C.6.4 Calculate:

$$C = \frac{(1)}{(2)} \cdot (3) \text{ as an approximation for } E(g,u) + U(g,u).$$

C.6.5 The equation in § C.6.4 takes the discount factor applicable to E and applies it to U in order to ‘gross up’ the undiscounted provisions for discounting.

C.6.6 Calculate:

$R(C)$ = reinsurance recoveries if claims reach C , which is dependant on size and nature of reinsurance.

Note: $t(C)$ = mean duration of claims payments C

$t(R)$ = mean duration of reinsurance recoveries $R(C)$.

Thus the minimum net provision would be (approximately):

$$C \cdot \frac{(2)}{(1)} - \frac{R(C)}{(1+i)^{t(R)}} = (3) - \frac{R(C)}{(1+i)^{t(R)}}$$

where i is such that $(1) = (2) \cdot (1+i)^{t(C)}$.

In certain circumstances (if $t(C)$ and $t(R)$ are sufficiently close) this could be approximated by:

$$(3) - \frac{(2)}{(1)} \cdot R(C).$$

APPENDIX D

SPREAD LOSS CONTRACTS AND STOCHASTIC MODELLING:
AN EXAMPLE

(See Example 4, Appendix B, for a complete explanation of spread loss contracts.)

The key terms of the contract are:

The contract is continuous and incepts 01.06.1990.

Cover is for £3m \times £1m each and every loss.

Maximum recovery is £6m in the aggregate (i.e. one reinstatement).

Premium is £900,000 p.a., adjusting as per premium adjustment clause.

Minimum premium is £450,000 p.a.

Cancellation clauses (rather intricate; it would be necessary to examine the full clauses in detail to understand them fully).

In order to obtain both a clear picture and an estimate of the financial effect of writing a spread loss contract, it is necessary to set out a number of likely scenarios of loss incidence and to work through the results. A further picture can be obtained by use of a Monte Carlo simulation based on estimated loss frequency and severity, which are, in turn, derived from known catastrophe statistics for the class of business locations covered, the layer of reinsurance covered and, generally, the nature of the exposure protected. Very complete such statistics are available for U.S.A. catastrophes; rather less for other parts of the world. Furthermore, it is necessary to try the simulation on several different assumptions to obtain an understanding of the likely cost profile, particularly where frequency is judged to be very low, but severity very high.

In what follows, one such set of frequency assumptions has been postulated and tested. These assumptions are fairly arbitrary:

- loss frequency Poisson, one claim every 3 years,
- loss severity Pareto ($\lambda = 1,000,000$, $\alpha = 1.50$),
- loss development spread over 3 years,
- interest rate 10%, and
- inflation rate 4%.

In addition, it is assumed that the contract runs for 10 years and is cancelled at the end of this period. One might, however, wish to include cancellation as one of the variables in the model.

The results of a trial run are shown as an example in Table A.1. From these, it can be seen that the contract replaces the humpy claims distributions by a smoother reinsurance premium distribution, and that, in general, for this contract annual premiums decrease over time.

For this contract, both the price and the cover afforded vary with loss

Table A.1. A Trial, One Claim in Year 3

Year	Cover (first loss) £000	Cover (second loss) £000	Claims paid £000	Premium £000	Discounted cover* £000	Discounted premium £000	Discounted claims paid £000
1	3,000	3,000	0	900	3,776	858	0
2	3,000	3,000	0	631	3,631	547	0
3	3,000	3,000	1,200	450	3,491	355	946
4	3,000	0	1,290	1,222	2,615	875	924
5	3,000	0	510	964	2,515	628	332
6	3,000	0	0	700	2,418	415	0
7	3,000	0	0	474	2,325	255	0
8	3,000	0	0	450	2,235	220	0
9	3,000	0	0	450	2,150	200	0
10	3,000	0	0	450	2,067	182	0
Terminal payment				(3,654)		(1,343)†	
			3,000	3,037	27,222	3,191	2,202

* Discounting for inflation and probability of a first loss occurring, i.e. for risk of second loss exposure being pertinent.

† Approximately, as claims have not been modelled after year 10, and have been approximated by taking all claims remaining to be paid, to be paid half way through year 11.

experience. In order to calculate an average price for this contract some measure of the cover afforded is required, so that exposures at different points in time can be compared. It is suggested that the cover available for second losses be discounted by the probability of a loss occurring and by the general inflation rate, so that cover for a unit of real-money exposure at any point in time is regarded as having the same value. (This ignores the possibility of ruin for the reinsured and the loss severity distribution.)

On this basis, the model showed, for 1000 trials and for 10 model years:

	£
Mean total discounted cover over 10 years (see later for details of calculation)	27,341,000
Mean total discounted premiums/plus minus cancellations payments	2,582,000
standard deviation £1,442,000	
Mean discounted claims paid	1,644,000
standard deviation £1,284,000	
Mean total cost to reinsured	939,000
standard deviation £177,000	

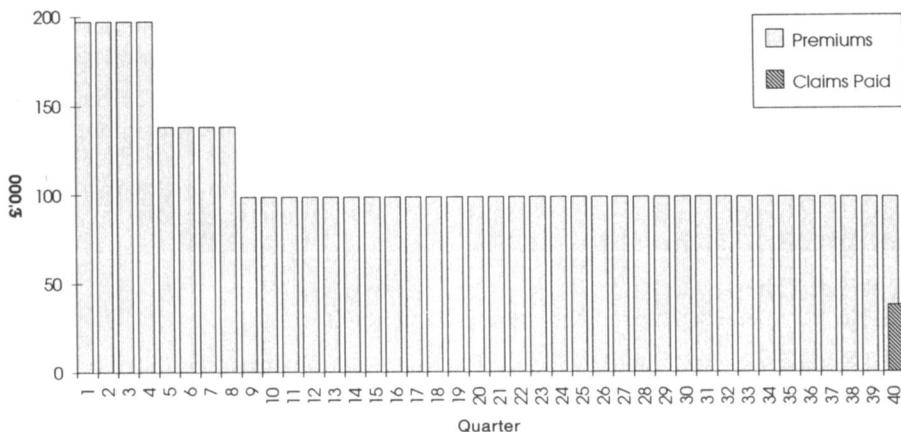
Financial Reinsurance

Table A.2. Accounting results on various bases

		Year									
		1	2	3	4	5	6	7	8	9	10
Profit and loss account											
Charge/Credit		1	2	3	4	5	6	7	8	9	10
Method		900	631	450	1222	964	700	474	450	450	450
A		634	69	830	1536	637	22	-62	-112	-162	-216
B		93	-4	1426	1439	613	22	-62	-112	-162	-216
C		536	536	536	418	418	418	418	418	418	418
D											
Balance sheet fund											
for reinsurance		1	2	3	4	5	6	7	8	9	10
Method		0	0	1672	486	0	0	0	0	0	0
A		266	966	586	272	599	1277	1813	2376	2988	3654
B		807	1442	465	248	599	1277	1813	2376	2988	3654
C		364	459	2045	1663	1722	2005	2062	2094	2126	2159
D											

For definitions of A, B, C, D see Section 6.8.2.
All amounts are £000.

(a) Trial 1



(b) Trial 2

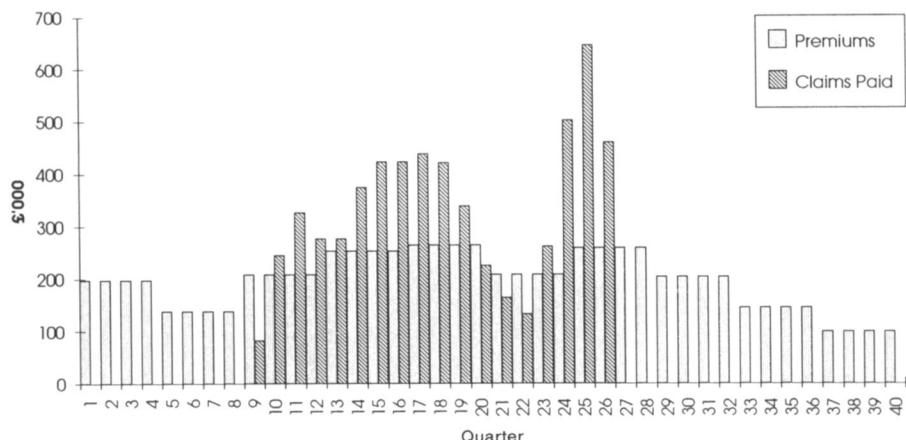


Figure A.1. Example Monte Carlo Trials.

If a modified rate on line (ROL) is defined as the premium divided by the discounted cover, the trial results are:

	%
Mean discounted cover to mean premiums	9.44
Median modified ROL	7.65
Upper quartile ROL	14.2
90th percentile ROL	23.0

Suppose we choose the upper quartile value as a prudent estimate:

We then have discounted cover for the first year of £3,776,000⁽¹⁾ so that the cost to be charged for the cover is 14·2%*£3,776,000 = £536,000.

If we use this value for the cost, let one claim of £3m occur in quarter 9, and then apply each of the accounting bases suggested in Section 6.8.2, we obtain the values shown in Table A.2.

Thus, to provide some indication of the results of a simulation, the two tables, both resulting from one run in one Monte Carlo simulation, and showing one loss of £3m in quarter 9, are:

Table A.1 the actual figures relating to each year's activity, and
Table A.2 the accounting figures that would result.

The results of one complete Monte Carlo simulation are to produce a modified rate on line of 14·2% (upper quartiles from trial).

Also, Figure A.1 shows the results of two trials within one Monte Carlo simulation, and indicates that the reinsurance premiums payable, even under the carry forward effect of a spread loss policy, are a great deal smoother than the claims.

⁽¹⁾ $3776 = \frac{\text{limit} + \text{limit} * \text{poisson probability of a claim}}{(1 + \text{inflation rate})^{0.5}}$.

ABSTRACT OF THE DISCUSSION

The discussion at the meeting was based on the original discussion document described at the beginning of the paper.

As the paper printed is not this original one, and as the order in which the material has been presented has been changed, when speakers referred to specific sections and paragraphs of the original paper these have been altered, in this abstract, to their equivalents in the paper which is printed here.

Mr P. H. Hinton (opening the discussion): An increasing amount of financial reinsurance is being sold. It apparently meets a need and is here to stay, but it has been abused by companies to hide weaknesses in their balance sheets. They have disregarded the relevant part of the ABI SORP, and have failed to account properly for the economic substance of these contracts. The DTI have considered it necessary to refer in no less than three market letters to this abuse (Appendix A). None of this reflects well on the insurance industry. This misuse of financial reinsurance is what makes the subject both topical and urgent.

I have considerable difficulty in understanding the economic purpose that most financial reinsurance is intended to serve. In a few cases asymmetry of tax treatment between cedant and reinsurer provides an obvious answer. Lloyd's presents a special case, but in most cases the real motive seems to have been the cosmetic effect on the cedant's balance sheet. The only obvious economic effect is a profit flowing to the reinsurer and the broker. Numerous articles have failed to explain clearly the benefits to the cedant. Stripped of superfluous wording, they boil down to the statement, "the balance sheet will look better". I hope that there will be more examples in this discussion of financial reinsurance contracts to add to those described in this paper, and that these will include some which have a clear benefit to the cedant which is not merely presentational, and in which tax asymmetry does not play a part. Often the reinsurer is much more sophisticated than the cedant. Cedants may have been sold products they do not need and which do not provide the protection wanted. Any actuary employed by the reinsurer needs to be careful that he is not a party to any misrepresentation, innocent or otherwise, and to avoid giving the impression that he is providing actuarial advice to the cedant.

When the E.C. Directive on Insurance Company Accounts has been transposed into U.K. law, there will need to be a revision of the ABI SORP and accounting guidelines. The issues are too important to leave to insurance companies and the accounting profession, and all of us with an interest should seek to contribute to this exercise. I welcome comments on this in the context of the problems raised in the paper, and on the various other regulatory steps that have been, and should be, taken in response to the abuse of financial reinsurance. Are the DTI market letters sufficient, or should more be done, and if so, what? Should there be more action by, or guidance to, auditors? What do auditors feel about the situation? Should there be prescriptive regulation, with the danger that loopholes will be found and exploited? Is the FAS 113 approach of deferring recognition of profits arising from retrospective contracts a sound one, or does it ignore some possible abuses and fail to recognise real economic benefits flowing from other treaties? Are attempts to distinguish genuine reinsurance from predominantly financial contracts helpful or are they likely to be ultimately self-defeating?

The example in § 5.3.6 is important. It shows that greater attention must be paid to the distribution of claims, and not just to their mean amount. I am convinced by this that some form of stochastic modelling of claims is essential. The difficulties should not be underestimated, not least the fact that we seldom can know the underlying distributions, but without calculations on a reasonable basis, how can we possibly understand the effect of a complicated reinsurance programme on the net liability?

Most of us at some time have met the inverse phenomenon to that in § 5.3.6. Take a motor claim of 200, with a 50% chance of success. The insurer might provide 100. If he was reinsured for the excess

above 100 he might still provide 100 on a net basis, although 50 would be a more correct figure. No-one (except perhaps the Inland Revenue) would be too concerned about this, because the error was on the side of prudence and small in the overall context of the company. However, we are now faced with the situation that, for many companies, reinsurance protections have been, or are likely to be, burst, and the errors are in the opposite direction.

The sale of reinsurance products designed to exploit erroneous provisioning of the type highlighted is yet another reason to re-examine reserving calculation and philosophy. Provisions should not be established mechanically without consideration of their purpose. If we concentrate on what contracts deliver and when, and on associated costs, then we can ascribe a value to them without needing to decide whether they are reinsurance or banking transactions.

A key idea is that, when reserving, a company should have a clear understanding of what is meant by reserve strength and of how strong its provisions should be. In assessing the provisions against this standard, full account should be taken of all relevant factors, including expenses, reinsurance failure and the investment income to be generated from the provisions.

In Appendix C there is an implicit assumption that, if expected outgo is estimated, then taking the undiscounted amount as the gross provision will provide an appropriate degree of strength. I do not agree with the assumption, but it is not essential to what follows. The paper states that approximate calculations, with a suitable criterion of strength in mind, can be used to avoid the need for detailed calculations in many cases. How realistic is this? Would this approach, combined with a clear understanding of the reinsurance programme, make the misuse of financial reinsurance to 'improve the balance sheet' less of a problem?

A possible criterion is investigated in Section C.5; that provisions be sufficient to meet the liabilities with a likelihood of $x\%$, where x may be implicit rather than explicit. How appropriate is this criterion? The simple example gives a more sensible result than the conventional calculation. However, it is somewhat counter-intuitive that the relatively high level cover excess of 24 is given equal weight to cover excess of 12. A very high level cover excess of 32 would, as in the conventional calculation, receive no credit at all. If there were more than one risk, each with similar protections, the higher level covers become less valuable against the criterion adopted than the lower level covers. This accords better with intuition.

What are appropriate criteria for measuring strength? Should there be a single criterion or are different criteria appropriate in different circumstances? What level of strength should the provisions of different types of companies have? Is it possible to describe the criterion and how a company measures up against the criterion in the accounts? Should additional information be provided in notes to the accounts, showing how the provisions measure against other criteria? Should the strength of the company as a whole against the criteria be disclosed?

Accounts by themselves can never tell the whole story. A company that has burst its protections or has dispensed with high-level cover is quite different from one which has adequate protections. What additional information is required when assessing such companies? Where there are major uncertainties, how meaningful can accounts be?

Two further thoughts: what about financial insurance; and are there any lessons from the life side for general insurers or, indeed, vice versa?

Mr H. H. Scurfield: Actuaries need to continue to move quickly along the learning curve of general insurance, in particular if we in this country are to follow the lead being set in some countries overseas, where actuaries are being asked to give a formal opinion of the claims reserves as a part of the statutory supervision of insurance. Last year Canada went one step further than the U.S.A. where an actuarial opinion is required, when they introduced the concept of the Appointed Actuary, not just for life insurance, but also for general insurance. I detect the start of a momentum within this country towards some form of statutory opinion, and it is as well that we have been preparing ourselves. Already over 60% of the actuaries working in this country have passed the general insurance examination, and by next year 230 actuaries will be working in general insurance, two-thirds of whom have more than 4 years' experience.

There is a suggestion that other professions might be able to provide such an opinion, but I believe that we are better equipped than any other profession; given our code of conduct, guidance notes,

education syllabus and continuing professional development. This paper reminds us that the issues in general insurance are complex, and that supervision based on detailed rules does not provide the full answer. I believe this to be particularly the case in such a fast moving market, the more so given the pitfalls involved in financial reinsurance.

I was particularly struck by four points in this paper:

- (1) Paragraph 5.3.6 refers to the difficulty of calculating the reserves net of financial reinsurance. The obvious and simple answer, based on a net provision, produced too small a result by far. The separate gross and reinsured provisions must be considered using a distribution of claims.
- (2) Financial and conventional reinsurance are not discrete wholes. There is considerable overlap, and, therefore, the treatment of reinsurance in the accounts and returns needs to allow for both together. This theme runs throughout the paper.
- (3) Paragraph 4.5.1 discusses the discounting of reserves. It has been established practice that reserves should normally not be discounted, on the grounds that this allows a safety margin, in particular for inflation of claim costs. This paragraph quite rightly calls for the valuation to be done on a more explicit basis, so that full allowance for inflation, discounting and other factors, including financial reinsurance, can clearly be seen. This must be right, but would be a significant move away from tradition.
- (4) The calculation and monitoring of the reserves in a general insurance company is uncertain enough, even without financial reinsurance. Financial reinsurance increases the complexity and reinforces the need, stated in § 9.9, for "some sort of professional reporting by individuals who have a thorough knowledge of the business", but—and these are my words—they need sufficient training, experience, professional guidance and discipline. Who else is there but the actuary?

If I have any reservation about the paper, it is only because it has made me impatient to see solutions to the problems which it has warned us about. The debate has begun; the solutions now await the next paper on the subject, and I hope it will not be long in coming.

Mr J. P. Ryan: Appendix C provides some very interesting ideas as to how to approach capital adequacy. However, it is a disaster as regards accounting techniques. Essentially, if applied as indicated in the paper, it would negate most catastrophe reinsurance, which is designed to reduce the deviation on the net account. If they went to the extremes laid out in the paper, then most companies would be very severely restricted in taking out conventional reinsurance.

The example in § 5.3.6 is a somewhat artificial one as a financial reinsurance contract, in that there are only two discrete probabilities of the outcome. It is much more akin to a large property catastrophe, which is unlikely to arise in that way as a financial reinsurance contract.

The approach in the paper would actually stop some conventional reinsurances being taken out. There is a need for catastrophe cover for companies writing conventional household business. They too would be penalised in the same way as a no risk financial reinsurance. This indicates that it would be a mistake to try to make an artificial accounting system handle the problem. Make sure the company is capitalised in order to deal with this—yes; but that is different from trying to obfuscate the accounting system to solve a problem that could be handled by adequate disclosure.

It is important to realise that financial reinsurance can serve a useful purpose. It is often the only way that real cover can be provided for certain types of risk. The types of contracts that provide no risk transfer at all are legally not reinsurance contracts and serve no useful purpose.

It is also important to realise that companies, once they get into weak positions, need all the help they can get. Anything that we do as a profession that prevents them from obtaining some necessary risk transfer is not doing the insurance industry or the policyholders any service at all. On the other hand, it is important that we should not be privy to a covering-up action. The object of these policies should not be to mislead the regulator, investors, policyholders or insurance company managers, and should not deter corrective action when it is required. This is why the letters from the DTI are very important.

It is important that we educate the public, and disclosure to the policyholders and the outside world is a much more effective approach than that outlined in the paper of putting in extra reserves. There are three areas where uncertainty has meant that the public have not been educated properly.

- (1) *Uncertainty in reserves policy.* There is uncertainty in the overall level of reserves, as described in Section 6.9. The paper refers to a contract that pays out on the last £20m of reserves, and basically points out that, on a discounted value, there is not very much cover for the premiums going through. Fine, but quite a number of these contracts are bought, and the reason is because we do not readily know what the last £20m is going to be. If it is going to be paid a long time in the future, the accounting system makes it very important, because that has an enormous impact on this year's profit or loss, but it is not very significant in terms of the overall financial position of the company, provided one is clear that it is the last 20 years of reserve. The reinsurance contract is closer to reality than the accounts.
- (2) *Equalisation reserves.* Much useful information on the need for equalisation reserves is provided in Appendix D.
- (3) *The impact of investment income on an insurance company.* Some 20 years ago it was stated that if we had discounted reserves everything would be much simpler. In particular, the Lloyd's regulations and general accounting not allowing discounting is doing a disservice, in not explaining to the public what the impact of the true value of money means.

We should make accounts simple and easily understood to the rest of the outside world. I believe that the chartered accountants have got it right; there should be a distinction between provisions and reserves. We are talking about provisions and what comes through the accounts; the reserve is the extra margin which is called for in the paper.

There should be a requirement to disclose, in broad outline, all the material contracts written in this area. That would solve many of the problems of the regulator, the investors and the policyholders. Non-disclosure, in my view, is fraud (although no doubt that would not stand up in a court of law).

There is a positive need to encourage financial reinsurance where it is an additional source of capital, which is what many of these contracts are supplying. It is more akin to the sort of mezzanine finance, to use a corporate venture capital term, rather than conventional insurance, but, in terms of providing that finance, it is actually providing a valuable service to the insurance and reinsurance industry, particularly those that are currently in difficulty. However, this should be done with full disclosure.

Mr J. W. Dean (a visitor): Americans have a much greater appetite for accounting standards than we do in the U.K. They have issued five times as many standards as the U.K. profession has. FAS 113 deals with reinsurance, and clearly financial reinsurance is a part of that. FAS 113 has moved on quite a long way from the original drafts, and is a very much more sophisticated document than the early exposure draft. The Americans have added to the 'timing' and 'amount' risks, which are typically used as measurements of risk transfer. The reinsurer must now have a reasonable probability of experiencing significant loss—a useful additional requirement.

In taking out a retrospective contract a company should experience neither profit nor loss, except in certain fairly closely defined situations. There is an interesting grandfathering provision which means that, if you already have a retrospective contract supporting your balance sheet at the moment, then (fortunately for some) you will not have to change the accounting treatment.

The standard has given the U.S. profession some interpretation issues which they are dealing with. Interestingly, most of those are not actually to do with pure financial reinsurance contracts, they are more to do with all the things that have got swept up with it. For example, structured settlements are a common way of settling liability claims in the U.S.A. A property and casualty underwriter buys an annuity contract for the claimant, and in some of these situations the P&C underwriter retains the primary obligation. With FAS 113, this practice of settling claims and dealing with them as paid claims is being re-opened. People are looking at the FAS's requirements for gross and net disclosure, and saying that, for these contracts, if the structured settlement annuity has no more than matched the liability of the primary carrier, then the primary carrier really does still have a gross liability. Discounting is not permitted in the U.S.A., and the primary carrier is, perhaps, going to have to book that liability on an undiscounted basis. This does very nasty things to insurers' balance sheets, and the accountancy profession is looking into how best to interpret FAS 113 for structured settlements.

In the U.K., a technical release draft came out a little over a year ago. FRED 4 deals with the

substance of transactions, and is not a specific document for the insurance industry. It does, however, clear the way for supplementary guidance, specifically tailored for the insurance industry, to be brought forward. The accountants may be going forward on two bases, one of which will be a derivation from FRED 4. The other will be based more on the technical release draft which was circulated over a year ago. The working party has still to come up with its position on this matter.

The DTI issued a letter in December 1992 (Appendix A), which quite conveniently distilled the whole problem into two pages. I was particularly interested in the penultimate paragraph of the letter, which asks for those involved in preparing DTI returns, or auditing them, to split reinsurance contracts between their risk transfer element and their financial element. There was no guidance given as to how and when to deal with that point. At one end of the spectrum there might be a view that insurance, and certainly reinsurance, premiums are set acknowledging the time value of money. Therefore they all have a financial element, and, perhaps, we need to split every single reinsurance contract into these two elements. At the other end of the spectrum there is, perhaps, a view that, as we are already allowed to discount claims liabilities for accounts and DTI returns, any additional discounting which is brought in by a financial reinsurance product, or reinsurance with a financial element, makes no change to that. It is not adding in any way to the distortions we already have in DTI returns as a result of discounting, and, therefore, we do not need to make any changes. Perhaps the most important thing that the DTI letter will do is to make companies indicate more clearly what is happening in their accounts: identifying the important reinsurance contracts they have and disclosing clearly how they have been dealt with in their DTI returns. If that is an interim solution, then I suspect that it is quite a good one.

Mr C. J. W. Czapiewski: For many years we have had insurance contracts with a savings (or banking) element and a risk element. These have occurred in both life assurance and non-life insurance; so it is important to emphasise that we are *not* discussing new types of contracts, but ones that have been around for quite some time.

At the risk of over-simplification, let us consider one type of reinsurance mentioned in the paper: the spread loss contract. The insured pays his premiums. He makes a claim at some stage. His premium then rises for a few years, then settles back down again. This is shown in Section 6.1 as a financial reinsurance contract. However, this is just the way that a traditional reinsurance operates. The *only* difference occurs on cancellation or non-renewal. If the cancellation terms are penal on either side withdrawing whilst in the black, then the reinsurance fulfils the needs of the other party by providing the benefit when it is most needed. There is indeed risk transfer.

These contracts are not purchased or sold by unthinking underwriters, brokers and reinsurers, but are insurance products created for a purpose that they generally fulfil. Of course, in certain scenarios of intense loss frequency and severity problems will arise, but this also happens in the more traditional types of reinsurance.

Let us consider how we can ensure that full information is given for all types of insurance and reinsurance and how we can ensure that reports and accounts of other returns are accurate, but let us not be luddite and negative. Let us be constructive and positive.

Mr D. M. Hart: The subject matter of financial reinsurance is important and topical, and I believe that the profession can, and should, make a significant contribution in developing a more sensible regime for dealing with it.

I agree with the paper that artificial distinctions between 'financial' and 'normal' reinsurance are not in the best interests of the industry, the regulatory authority or the professions. Given an arbitrary dividing line, someone will always find a means of being 'just the right side of it'. The same, however, applies to solvency and taxation rules. I have considerable sympathy with organisations who use financial reinsurance to circumvent, in a perfectly reasonable, properly accounted and properly disclosed manner, such arbitrary regulations.

Mr D. J. Hindley: In § 3.4 the paper considers the London Market excess of loss spiral. I do not think that the main problem with the LMX market was that the market took on more than it could stand, rather that it was an inefficient way of spreading the risk around the market.

In § 3.8.2 there is a discussion of how actuaries involved in reserve setting should be made fully aware of the contracts, and how they affect the financial statements of the company. I agree with this, but we should be more proactive in looking at the three key issues which the paper touches upon, namely: the determination of whether a particular contract transfers risk, if any; the determination of whether or not the contract provides value for money for the buyer; and the assessment of an equitable accounting treatment for the contract. These issues can also be used to assess whether a particular accounting treatment is reasonable, because, obviously, we do not want an accounting regime which still gives a misleading position of strength.

In Section 2.4, the paper quite rightly states that it does not really make sense to draw some judgemental line between traditional and financial reinsurance contracts. However, it is essential that actuaries help to develop techniques for the quantification of the risk transfer, which can be applied to all forms of reinsurance, thus removing the need to have any dividing line. This would also help at Lloyd's where, as the paper reminds us, there must be a genuine and material transfer of risk before a contract can be classified as reinsurance.

On the subject of net claims reserving, the paper suggests that one possibility for getting round the problem of this sort of reserving, where non-proportional reinsurance is present, is to use some form of simulation. I do not think that such an approach is either practical or desirable. The paper suggests that existing, generally accepted approaches do not take into account the stochastic or uncertain nature of insurance. There are, however, a number of techniques currently used which do take this into account explicitly. Furthermore, in an LMX account most actuaries, nowadays, assess the sensitivity of the net reserves to changes in the gross ultimates hitting the outwards programme.

Concerning the variability of net claims, the ability of a contract to reduce this variability depends critically on the terms and conditions of the contract. It must be possible to design contracts which do produce a genuine reduction in the variability of net retained claims.

I find that the only way to try to understand how a particular contract works is to set out in a spreadsheet format the cash flows arising from particular claims scenarios, and I think that it was a pity that such spreadsheet formats were not included in the paper.

I was disappointed that the conclusion in § 9.10 was that actuaries should be involved in discussions of accounting standards. Whilst I agree that the accounting treatment is critical, I would like to think that we have much more to offer in the design and assessment of these contracts, so that, in an ideal world, they can provide a profitable source of business to reinsurers and real and much needed protection for the cedants at a fair price.

Mr A. N. Hitchcox: I have been involved in many financial reinsurance contracts, both on the buying side and on the selling side, and I would like to highlight a few points derived from practical experience.

- (1) I find it generally easier to value such contracts, not on the basis of probability distributions, but on the basis of scenario analysis, where you build a model of the contract and test the value under several different outcomes. In particular, I stress that you should always test the reaction of the contract to extreme values of these underlying assumptions. I give two examples. For a discounting type contract you should test what happens if the underlying cash flows are, say, half or double what a normal assumption would be. For a catastrophe type contract—for example a spread loss cover—you should model what the outcome might look like after, say, 0, 1 or 2 total losses in the year. These are particular examples of the spreadsheet type of analysis that Mr Hindley referred to.
- (2) Your model of these contracts will need to show, not only the likely cash-flows under the contract, but also the likely reserving position for future accounting periods, assuming that the current rules persist in the same way. Generally speaking, the cash flows will show what you might call the actual economic costs of the contract, and the reserving positions will show how the contract appears, that is what its benefits might be.
- (3) It is vital to value the cancellation options of these contracts. Often these are the swing factors in determining the contract's value. Sometimes an unusually written cancellation clause is the first

due to the casual reader that he or she is dealing with a financial reinsurance contract, as opposed to a traditional one.

- (4) Each contract is highly complex, requiring very detailed attention. Any organisation getting involved in such contracts needs to understand that they are likely to consume much time at senior executive levels.

Mr D. H. Craighead: Commenting on the reserving requirements as set out in Section 6.8, these will stem from the particular nature of the reinsurance. The reinsurances themselves vary so greatly in nature and in the detailed clauses that it is necessary to examine all the clauses very carefully indeed to understand precisely what is intended and what can happen under varying conditions.

Time and distance policies are essentially used as tools for discounting. It is necessary to be clear about this factor, as cases have occurred where time and distance financial reinsurance has been purchased and then (or previously) the reserves have also been discounted, amounting, in fact, to a double discounting. A similar position applies when the future receipts from investment income are taken into account in determining the reserve for future claims handling expenses (which is now required to be provided for) and there is already a time and distance reinsurance policy in force. There could be a triple discounting of the same reserves.

A time and distance reinsurance policy will often involve a high rate of interest, particularly as funds are likely to be invested offshore, therefore free of tax on the investment income. It should be noted immediately that there is not a tax saving, as the purchase of such a policy involves an immediate tax liability of the full amount up front. There is, however, an additional difficulty, in that the repayments from the time and distance policy will be at precisely defined points of time in the future and will total precise amounts. It is extremely unlikely that the actual claim payment requirements will match those points of time, however carefully they have been evaluated. Hence, it will be necessary to set up a reserve which may well be substantial in amount to allow for a possible necessity of finding monies earlier than provided for, or finding more monies, or to reinvest monies which have been returned by the reinsurer before they are actually required.

If a spread loss policy has been purchased and there is no claim to date after 1, 2, or more years, then reinsurance premiums will have been paid and will appear as outgo in the revenue accounts. To my mind there is no reason why part, though not all, of those premiums may not be carried forward as a negative amount in the calculation of the reserves required by the office. They will certainly be available in the future against catastrophe losses that may impact the layer concerned. If either the cedant or the reinsurer withdraws from the reinsurance contract at an early stage, there are usually substantial profit commission amounts which have to be repaid by the reinsurer, very often 95%. Hence, even if the cedant has decided to stop underwriting so that there is a run-off position, or if the cedant is actually insolvent, the recovery of a percentage of the premiums will be substantial. I see no reason why methods embracing a Monte Carlo approach, based on suitable estimates of the parameters used within it, cannot be used to judge the negative amount so deducted.

In an ideal world the reinsurer will carry the same reserves as the reinsured. Undoubtedly, if the reinsurer in such a case has received premiums, but may have to meet claims in the future arising out of those premium receipts, then a wise actuary or accountant will require the reinsurer to carry reserves against such an eventuality, not less than the amount repayable on cessation of the policy. There is no reason why the two parties should not carry the same amounts forward, although there may be some greater caution on the part of the cedant.

There is much more difficulty in the case of spread loss type reinsurance contracts where claims have already occurred. It can be held that the possibility of further claims arising in future years on the same layer is small if the layer concerned is very high and it is judged that the impact of such claims of catastrophe is likely to be small. Therefore, some alleviation of the carry forward can be allowed for on a Monte Carlo simulation basis, based on the type of forward thinking that has been described. The letters from the DTI, particularly the third letter, made clear that provision must be made for the increase in the premiums that will result from the claims that have already occurred, but they do not specify that it must be the full amount. They may have thought that that was implied, but the precise requirement is not very clear.

There is a case for using a lesser amount, based on a prospective reserving approach. If, however, the reinsurance policy provides that, on cancellation, the full remaining amount of the claims less premiums already paid must be refunded—as most of them do—then it is essential that this provision be made in full, particularly to cover the case of insolvency or run-off. It may be argued that, if the company is in a very strong position financially and has substantial capital, there is a case for a prospective viewpoint. I am somewhat doubtful about the validity of the argument. On the other hand, a similar position applies to conventional reinsurance. When losses occur, the reinsurers will attempt to recoup them by raising premiums, even substantially. The cedant is then faced with a choice: either pay the higher premiums; or reduce the portfolio to a net exposure—as many have had to do in the last few years—which may mean sharply reduced volume and therefore higher proportionate administrative expenses. Either way, there is a cost resulting from past losses, and it can be argued that the extra cost should be provided for.

Perhaps we are looking too closely at the annual accounting basis as specified by the accounting industry and required by the Companies Act. Life insurance does not take this approach (although it may be tending somewhat towards it). A fund is built up against what is judged will be required in the future; and the board of directors, acting on the advice of the management and the Appointed Actuary, will decide how much of the surplus should be released to the profit and loss account each year. We require a move towards the same sort of approach in general insurance, where a fund will be built up which includes sufficient covering for known and unknown factors, including possible losses that may arise in the future from latent claims stemming from past underwriting years and future catastrophes that may happen in intervals more frequently than anticipated. I think here particularly of the London Market syndicates or companies that specialise in catastrophe cover. In that way, a proper release of reserves can be made into a profit and loss account each year. Unfortunately, the fund will have to be built up, at least partly, out of taxed profits, unlike the situation in the life insurance industry. Nevertheless, I can see a future when general insurance companies, and in particular the London Market with its high exposure to catastrophe losses, will move towards such a concept.

Mr G. G. Wells: Financial reinsurance is a relatively new phenomenon in the general insurance market, but has existed for some time in the life insurance market. Two particular types of financial reinsurance used by life companies are:

- (1) *Financing treaties*, whereby new business strain is largely financed through the operation of a memorandum account with a 'friendly' reinsurer. The memorandum account is effectively an off-balance-sheet transaction, financed by future margins emerging from the block of business reinsured. Whilst there is a risk transfer with regard to mortality, this is usually small compared to the overall financing package, and the main risk assumed by the reinsurer relates to the persistency of the business ceded and the attendant risks that poor persistency brings with it.
- (2) *Surplus relief*, which offers the ability of a life insurer to convert part of the embedded value into current earnings. No additional value is created. Instead, there is a small, additional cost. This particular form of reinsurance is largely cosmetic and employed for financial engineering purposes.

One further aspect of reinsurance arrangements entered into by life insurance companies is the need for the actuary to comment upon them as part of the valuation report included in Schedule 4 of the DTI returns. Within the valuation report, the actuary would give consideration as to whether any financial reinsurance treaties impacted the valuation basis. If his view was that sufficient margins did not exist to meet the future repayments under the financing treaty, after allowing for any other projected outflows, it would be necessary to set up additional reserves.

Turning to financial reinsurance within a general insurance context, these particular instruments have been developed as a means by which (re)insurers can recognise a faster emergence of profit or report lower levels of liabilities than would otherwise be the case if the instrument was not purchased. The reasons for the purchase tend to result from large losses from natural catastrophes and adverse claims development of prior years, with the consequent erosion of a company's capital base. In order for such companies to present a reasonably sound balance sheet, financial reinsurance can be used to

smooth their profit profile, but the important point remains the need to adopt a sound strategy to operate profitably. To put financial reinsurance in place, without a plan to solve the underlying problems, will merely defer those problems to, perhaps, a more difficult time.

I have identified eight aspects to consider when an insurer or reinsurer is contemplating the purchase of financial reinsurance. These are:

- (1) *Security.* The amount of financial reinsurance that can be obtained is dependent on the level of the margins available. These will depend, not just on the figures that may be used in the accounts, but, perhaps on more pessimistic assumptions, for example lower interest rates, faster run-off profiles and, depending on the nature of the product, the level of expenses incurred. Sensitivity tests might need to be carried out, including stochastic modelling. Having determined the level of collateral available, financial reinsurance would be obtainable as a proportion of this amount. Clearly, the presence of bigger margins over those required will increase the comfort of the financial reinsurers, thereby increasing their readiness and ability to complete the transaction.
- (2) *Benefits obtainable.* The benefits obtainable would be dependent on the nature of the financial reinsurance product. In general these are two-fold, namely, the accelerated recognition of profit, or the reporting of a lower level of liabilities than would otherwise be possible, subject to the need to meet regulatory reporting requirements.
- (3) *The different routes.* There are principally two routes available: reinsurance finance; or a combination of reinsurance finance and bank finance. In general, financial reinsurance tends to be a combination approach, with the bank involved providing security to the reinsured by means of a suitable letter of credit or through the establishment of a trust fund. The costs involved in such transactions would be of the order of 2% p.a. of the face value for a letter of credit and additional fees for lawyers, actuaries and auditors.
- (4) *The cosmetic effect.* If a contract is treated as (re)insurance, the company's annual returns will reflect the reinsurance in the normal way, that is the full effect of these contracts on the balance sheet of the company would be included as a liability reduction (or asset enhancement, as appropriate), outgo debited to the revenue account as reinsurance premium(s) and income credited as claim recoveries, return premiums or commissions. However, financial reinsurance does not, in general, create any additional value; instead, there is a small additional cost to the reinsured, as both the financial reinsurer and broker involved make a profit.
- (5) *Amount of financial reinsurance available.* The amount of financial reinsurance that is available in the market is difficult to determine, but a figure in excess of £1 billion p.a. is probable. The larger the amount that is sought, the greater would be the need to consider the security. The other factor to consider is the extent of the demand for such facilities. I am unsure what effect other similar deals might have on the remaining capacity in this market; but since the favourable distortion achieved by the reinsured is mirrored by the financial reinsurer, they too may be concerned about the cosmetics on their accounts, although perhaps less so if based offshore. The effect on banks is less significant.
- (6) *Amount of financial reinsurance desirable.* The amount of financial reinsurance that is desirable is a function of the impact the repayment of the arrangement will have in subsequent years. Having accelerated the emergence of profit, there will be less available subsequently. If the amount being considered is small in relation to normal emerging profits, then there is no problem. If it is large, then it is desirable to look at the position for 2 or 3 years ahead (using stochastic techniques) to ensure that, commercially, there is sufficient room to manoeuvre in future years without difficulty.
- (7) *Timing.* The timing of a transaction such as this is dependent on a number of factors, one being the extent to which other companies are seeking to use this market. Since, to obtain a large sum requires the facilities of a number of reinsurers and/or banks, brokers, and potentially involves lawyers and auditors as well as other internal management, a period of 6 months may be involved. Shorter periods are achievable if all the parties recognise the need, and they apply the necessary resource.
- (8) *Involvement.* Whilst actuaries involved in general insurance are familiar with financial reinsurance and its implications on the valuation of liabilities, each transaction is going to be a

little different. The understanding and co-operation of colleagues and external auditors is essential. Financial reinsurance, particularly where it affects the emergence of profit in such a meaningful way, is inevitably going to attract the attention of the company's auditors. That is not to say that they will oppose the transaction, but they may approach these transactions from a different angle. Also, depending on the size and nature of the transaction, it may be desirable to inform the DTI to avoid surprises later. The increased involvement of actuaries in general insurance and the possibility of a statutory role for actuaries would, I believe, assist the DTI in their monitoring role, particularly where financial reinsurance and other complicated instruments are employed. A valuation report prepared by the actuary might be required, with a commentary on certain reinsurance contracts, conventional or financial, and their impact taken into consideration in the valuation of assets and liabilities.

Mr I. L. Rushton: I have been involved in general insurance for a long time and in the setting of claims reserves for over 20 years. There is a narrow line between what I call 'statistical' and what I call 'actuarial' techniques. The setting of claims reserves in general insurance is more on the statistical side than on the actuarial side. The profession can add more from the professional guidance side, but it may not be the only profession that can do that. I think that our role is growing in this area, but it is going to be difficult getting full support throughout the insurance industry. We must be careful we do not overplay our hand, because there are many people who do not support us.

I suggest to the profession that we might try to find evidence to show that, in other countries, actuarial certification has actually reduced the number of insolvencies. I have not seen any evidence of that yet, and others are saying that there is no such evidence. We should not forget the failure, 20 years ago, of a major U.K. motor insurer that had an actuarial certificate on its claims reserves, which proved—due to false assumptions—to be inadequate.

The Revenue are now saying that in Europe discounting is not permitted, and they are not allowed to put inflation (even if it is at a lower level, as in Germany) into their reserves. However, we have brought to their attention the point that is in the paper in §7.2(1), that states that no implicit discounting or deductions will be allowed under the accounting directives. The directive—or the U.K. version of it—goes further than that. It specifically says that you are not allowed to have the implicit discounting which would be there if you did not allow for inflation. So, the Continental Europeans are going to have to allow for inflation in the future.

Mr Craighead referred to the other area of equalisation—catastrophe reserves—and, along with members of Lloyd's, I have been pressing for the Government to try to put the treatment in this country on the same basis as has been permitted in a number of Continental countries.

Mr C. D. Daykin, C.B.: The Academy of Actuaries has published evidence of the differences in the survival rates of companies that have actuarial certification of loss reserves as opposed to other certification. There was very clear evidence that actuaries are more ready to modify their certificate to indicate that there is something wrong, whereas many of the other people signing certificates just sign them, and many companies subsequently get into difficulties.

On the question of actuaries and statisticians, of course there are many common elements in their training, and we expect actuaries who are working in this area to have a strong statistical basis to their studies. However, actuaries are also trained in financial matters, and I think that this is the difference that actuaries can bring to bear in this field. They are able to see matters as a whole and bring in the financial aspects as well.

Financial reinsurance can provide a useful economic service through the effective provision of capital for the business. Reference has been made to the way in which this is used in life insurance to help young companies develop. That is not usually perceived as so necessary in general insurance. I believe that this is partly because of the weaknesses of general insurance reserving techniques, that companies do not recognise the new business strain that is sometimes being incurred. Clearly, with a short-term contract it may not occur to the same extent, although, with contracts involving substantial risk and future uncertainty, there ought to be a big difference between the reserve at time 0 and the reserve at time $(0 + \Delta t)$ —in other words, an initial strain. There ought also to be very

substantial new business strain on contracts such as mortgage indemnity, which are written over longer periods. In those areas then, one might expect to see financial reinsurance of a similar nature to that which is provided in the life insurance field. The urgent need is to make sure that the nature of these types of contracts is fully disclosed, as several previous speakers have indicated.

I can also see economic benefit in the spread loss contracts, in providing something which in other countries is provided by the equalisation reserve facility. Where I have most difficulty is with financial reinsurance simply being used as a way of dressing up the balance sheet, as a substitute for discounting outstanding claims provisions. Views differ as to whether it is a good thing to discount or not. If it is not a good thing to discount, then it should not be permissible to have any financial reinsurance of this nature. If it is appropriate, then it is much better to have open discounting, with full disclosure of what is going on, than an obfuscation through a reinsurance contract.

In §4.5.1 the paper gives some of the concerns which I have about the problems of this for reserving. It probably means that there is inadequate attention given to the reserve for adverse deviations. There is also, probably, a risk that the unexpired risk reserve is relying on the future investment income to some extent, as well as the reinsurance contract, and insufficient attention is given to the run-off expense provision. My own preference is for a much more explicit approach, with a provision for adverse deviation and prudent discounting.

I was heartened to see the references to the solvency working party reports and the admission by the opener that he could now see the benefits of the stochastic cash flow approach, even though a couple of subsequent speakers expressed some doubts on this—particularly on the stochastic element. The concern that we had with our 1987 and 1990 papers (*J.I.A.* 114, 227 and *J.I.A.* 117, 173) was to ensure that the management of general insurance companies explored fully the cash flow consequences of both the assets and the liabilities, and that the full impact of potential uncertainty was understood. I am still convinced of the value of cash flow modelling for that purpose and of the need for extensive scenario testing, either on a deterministic basis using adverse scenarios, or on a fully stochastic approach. The follow up to that working party has been the production of a full length study book on stochastic modelling techniques for general insurance and also for life and pensions, in which I have been collaborating with Professor Teivo Pentikäinen and Dr Martti Pesonen. We hope that it will be published later this year.

Referring to the opener's comment on the possibility of financial insurance, it is interesting to note that general insurance companies in Japan have recently been writing household and motor insurance with a savings element—long-term business in effect. Some actuaries may be able to envisage the techniques of unit-linked permanent health insurance business being used to create unit-linked motor and unit-linked household. Perhaps then we shall really need financial reinsurance.

Mr A. D. Smith: The major reason for financial reinsurance, in the eyes of potential purchasers, is to indemnify against inwards claims. In Section 3 it is explained how the conventional reinsurance market has contracted, driving prices up, and some underwriters perceive financial reinsurance as a more complex alternative to the traditional protection they might have purchased in the past.

Unfortunately, the analysis of financial reinsurance contracts is beyond the traditional realms of underwriting expertise. The paper explains how financial reinsurance may be constructed to confound unpalatable regulations, but it can also confound uneducated buyers. For example, there seems to be a widespread misconception that rates on line for spread loss cover are directly comparable to rates on line for traditional excess of loss cover. It would appear that some sellers of financial reinsurance are exploiting this gap in expertise to sell contracts which are very heavily loaded in favour of the writer. Some of these contracts will return a profit to the reinsurer in even the most pessimistic of claim scenarios. The only risk the reinsurer takes is whether it will make a huge profit or a modest profit. Actuaries acting for the cedants might be able to prevent this exploitation, but all too often they are involved at too late a stage in the decision-making process, or are absent altogether. While it is possible to design financial reinsurance contracts which are of value to both parties as a risk-sharing vehicle, this does not appear to be a widespread market practice.

Mr W. M. Abbott: I would like to pose the questions: "Is the existence of financial reinsurance a

symptom of a greater malaise affecting the general insurance markets?" and "Should we be spending more time on identifying and curing the malaise than on discussing the symptoms?"

Part of what I see as the general malaise is the existence of opportunities for rules arbitraging, where, despite concepts of substance over form, the very existence of different rules encourages artificial distinctions. Three examples of different rules are: differentiation between ordinary and financial reinsurance; financial reinsurance and financing (that is banking) arrangements; regimes which encourage, permit or ban the discounting of reserves. This last item is particularly productive of the generation of activity to modify the effect of applicable rules, with large chunks of financial reinsurance schemes devoted to an end which would be unnecessary if discounting was mandatory.

However, we know why discounting is not enthused over—it is perceived to weaken the prudence required for supervisory purposes, and it could precipitate the payment of tax. Both these objections are not insuperable in a coherent regime which starts with going-concern provisions on a best estimate basis, then increases those provisions to a run-off basis, which could be used for both supervisory and tax purposes. This would then leave the free reserves to cover additional winding-up liabilities or asset reduction for admissibility purposes.

If we had such a regime, the normal assumption would be that going-concern provisions are less than run-off provisions. Let us consider the concept of 'payback'. An insurer may have a liability which is contingent, subject to other conditions, on it staying in business. In effect this could make the going-concern liabilities greater than the run-off liabilities. It will have to meet such liabilities out of its current capital or out of charging more to the next generation of policyholders. Whether it can charge more will depend on the market generally and on the non-availability of fresh capital or new entrants coming into the market.

The nature of many insurance products is that they cannot be spread over the market as a whole within the timeframe of one year; they have to be spread by the market as a whole over a period of time longer than a year. Moreover, there are circumstances where it will prove impossible in practice for the market, as a whole, to pre-fund all such losses. Easy access by new entrants to the market will inevitably lead to post-funding by individual companies being unachievable. The inevitable consequence will be insurers with difficulties in meeting their liabilities. The cycle will keep repeating itself with today's new entrants experiencing the same problem a few years down the track.

It is accepted that general insurance moves in underwriting cycles. However, like a spiral staircase, when the events come round full cycle they do so at a new level. The changes over the last 20 years have seen: the disappearance of cartels with their ability to post-fund losses; negative real rates of return changing to positive; inflation rising and falling; reinsurance availability coming and going; new distribution systems and an increase in consumerism. It is possible to argue that the market, as a whole, may be currently writing risks which, without some acceptable system of post-funding, are of doubtful insurability.

In order to deliver products that the consumer wants, it is advantageous to have systems which, in a carefully controlled manner, provide the opportunity to post-fund losses. Such systems exist in other fields, for example in pensions. Rather than spend time developing reinsurance products, it may be far more constructive for actuaries and the industry to develop market structures which can best deliver the goods of covering required exposures at a proper price and with minimal risk of non-payment of claims.

Miss J. E. King (closing the discussion): Financial reinsurance has come a long way in the last few years. It is important to realise that there is a wide range of contracts in the market, all classed under the umbrella of financial reinsurance. They vary significantly in nature. At one end are the time and distance type contracts that contain no timing or underwriting risk. At the other end are sophisticated whole account prospective multi-year contracts that can contain significant underwriting and timing risk and, to most intents and purposes, are very similar to traditional reinsurance. Far too many people still think just of time and distance contracts when financial reinsurance is mentioned.

Financial reinsurance is not new. It actually gets back to the roots of reinsurance and just contractualises the relationships that there have always been between the two parties.

When defining financial reinsurance, the goals of reinsurance in general should be considered; that

is for stability of results, capacity and security. If it is deemed to be reinsurance, then it surely should be treated the same as any other reinsurance.

There appears to be a belief that in financial reinsurance the net reserves are weaker than the gross reserves. This is not usually the case. Given the amount of risk transfer, the reserves may actually be stronger. Often financial reinsurance is bought to strengthen the reserves. It has been said that one of the fundamental features of financial reinsurance is that it does not produce a genuine reduction in the variability of the net claims. I disagree with this. Financial reinsurance can actually reduce the variability more than traditional reinsurance. Many financial reinsurance contracts provide for deterioration cover, which often makes the net reserves stronger than the gross reserves and reduces the volatility of the net reserves. The discount or implied discount is, in effect, guaranteed and secured, and is used to buy additional deterioration cover.

Many comments have been made in the paper and in the discussion about whether or not these contracts contain risk. My reply is that those who make such comments may not be familiar with many of the types of contracts that are being written now. Because the cover is finite, it does not automatically follow that there is no risk transfer. I know of many contracts that do provide significant losses to the financial reinsurer.

As part of the pricing analysis, the underwriter looks at various outcomes; projects the payout pattern, speeds it up 10% or 20%, slows it down 10% or 20%; looks at the outcome of reserves; looks at changes in investment income. If you had to realise your investments early because the payout patterns speeded up a little and investment returns had increased significantly, you would find that the asset that you were holding to pay the claims that you expected to pay x years into the future would first have to be cashed in early and so not to be worth so much, and secondly, if investment rates increased significantly, that asset would have decreased even further in value.

It has been suggested that contracts may be being sold to cedants that they neither want nor need, just to benefit the profits of the reinsurer and of the broker. I underwrite for the largest pure financial reinsurer, and I would be very surprised if any of the underwriters there would try to sell a product to someone who neither needs it or wants it, solely to make a profit for ourselves. Much of the time is spent with the cedants, looking at what they need and want. To try to sell something to someone that they do not need nor want, and that they are going to find, in a year or two, is no use to them, is probably the best way of going out of business.

A financial reinsurance contract, in effect, secures the payout pattern and also the investment rate that can be earned on the fund. I think that the benefit of transferring the timing and investment risk should not be understated. What is happening, in effect, is the securing of a payout pattern and an investment yield. Considering pollution and asbestos as an example, and assuming that Lloyd's was allowed to discount, how many syndicates would actually be capable, at the moment, of discounting pollution and asbestos? A syndicate would first have to try to project the losses, then discount them back at the appropriate rate of interest, and then have to ensure that the investments matched the expected outgo and supported the yield used for discounting. Maybe that would cause even more problems in the market. At present there are not the resources in many of the syndicates to do this, as very few actuaries are currently employed by syndicates or managing agencies. Until discounting becomes feasible, the value of a financial reinsurance contract is enhanced, as it allows the syndicate to guarantee a payout pattern and a yield and to transfer that risk, which is a very high risk, to a third party.

Actuaries will continue to be challenged by developments in this field. It is important that all reinsurance, including traditional reinsurance, is adequately disclosed, to enable actuaries to be fully equipped to be able to evaluate the impact of these transactions.

The President (Mr L. J. Martin): Whilst general insurance has, quite naturally, been a subject of much actuarial discussion and work over very many years, our involvement in it has, quite rightly, broadened in scope, both in theory and in practical application. This involvement will, I am sure, continue to grow—not only in the U.K., but in the world as a whole. Our involvement is here to stay.

This paper has taken us another step forward. It has highlighted a particular scene, an important and complicated area in which the actuarial profession is already involved. The paper has described this scene with illustrations in the appendices, and it has provided a most useful reference for students

of the subject. It has given many warnings to our members, and indeed to others who are involved in general insurance, of the professional risks and the business risks which are involved in financial reinsurance. It has also underlined the need for us to keep in close and regular communication with the supervisory authorities and also the accounting profession, with whom we work closely on this subject.

All the members of the working party have put in a great deal of work and prepared this valuable paper. We are much indebted to you all. We thank you. We watch the future with interest, and offer you our many congratulations and our thanks for your excellent work. Thank you all very much indeed.

Mr M. G. White (replying): Financial reinsurers clearly do know what they are doing. My experience of these contracts is that they do confer on the reinsurer the maximum award for the minimum risk, selling products to buyers less sophisticated than themselves, especially in the field of compound interest. However, I do admit that my position is towards the negative end. I wonder whether such reinsurers will not find themselves liable for punitive damages at some time in the future if a reinsured crashes and it transpires that this same reinsured was trading, thanks to financial reinsurance, in a far weaker condition than its public statements indicated. The risk of this happening may now be receding, as punitive damages are largely a U.S. problem, and FAS 113 has severely limited the scope for future balance sheet manipulations.

Mr Ryan and others have said that there can be so-called financial reinsurance policies which do give real, and not just presentational, benefits. I have not seen any. Also, there is still a major public interest in the integrity of insurance balance sheets. I make no apology for insisting that contractual payback on wind-up must always be reserved for regulatory purposes.

Our creative accounting culture, which is Mr Abbott's malaise, has not served us well in the past. It is a culture on which financial reinsurance feeds. Readers of the book, *Accounting for Growth*, by Terry Smith, will know that the urge to manipulate financial reports is not confined to the insurance industry.

In contrast, a management which had shareholders' true interests at heart would not be concerned about suppressing volatile results. The name of the game should be about maximising long-run shareholder value. One company in the U.S.A., which clearly is run along these lines, states in its annual report: "Accounting consequences do not influence our operating or capital-allocation decisions. When acquisition costs are similar we much prefer to purchase \$2 of earnings that is not reportable by us under standard accounting principles than to purchase \$1 of earnings that is reportable."

Spread loss policies are, in part, a response to the high price of non-availability of conventional reinsurance—catastrophe reinsurance, in particular. We have heard less in the discussion than I had expected of the lack of reinsurance capacity, especially for lumpy risks. What does capacity mean? The financial reinsurers will tell us that our own capacity is, 'by definition', the free assets as shown in our balance sheets grossed up by an 'acceptable solvency ratio' such as 0·3. However, *true* capacity is not a measure of how much premium the regulators will allow us to write, it should be a measure of how much risk we can afford to take. Instead of concentrating on premium capacity, an insurer should ask itself questions such as: "How much can I afford to lose without any adjustments to the balance sheet in the next year?" True capacity means shareholders' cash. The only way to increase the capacity of the U.K. insurance market to write big international risks is the retention of profits and the subscription of new capital. As has been said earlier, equalisation reserves may help; but as an investor, I wonder whether capital subscribed has been well used in the past. I hope that the capital that is being raised now, in response to the hard insurance market, will be better served.