

A supplementary note was prepared in October 2005 and added at pages 46 - 50.

This includes updated tables on:

Page 48 Default rates and times to default produced by Standard and Poor's (replaces Appendix F page 39)

Page 49 Default Probabilities - Moody's (replaces Appendix G page 40)

Page 50 Examples of paid recovery percentages (replaces Appendix I page 45)

REINSURANCE BAD DEBT PROVISIONS FOR GENERAL INSURANCE COMPANIES

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1 TERMS OF REFERENCE

- 1.1** This paper had its origins in another paper produced by the working party in the specific context of the Lloyd's market, which described possible methodologies which could be applied by actuaries who are providing statements of actuarial opinion on Lloyd's syndicates. Following the completion of the Lloyd's paper, the working party was asked to produce a further paper on reinsurance bad debt provisions which would be of more general application to companies transacting general insurance business.
- 1.2** There is currently no standard approach to the assessment of reinsurance bad debt provisions. Against this background, the working party has adopted the following terms of reference for this paper:
- to prepare a paper on reinsurance bad debts which includes:
 - the principal actuarial issues which need to be considered when setting reinsurance bad debt provisions
 - possible methodologies which could be applied by actuaries.
- 1.3** The paper is *not* intended to prescribe methodologies which actuaries *must* follow. Working party members and the General Insurance Board feel that this would stifle professional judgement. However, the working party would like to encourage a broadly consistent approach among actuaries in the area of reinsurance bad debt provisions. It is considered that such a consistent approach would be beneficial to the standing of the actuarial profession within the general insurance market.
- 1.4** The scope of reinsurance bad debt provisions normally includes:-
- currently unpaid reinsurer balances
 - future expected reinsurance recoveries, including recoveries corresponding to gross outstanding claims, IBNR (incurred but not reported) claims and IBNER (incurred, and reported, but not enough reserved) claims
 - reinsurance disputes as well as reinsurer insolvency
- and each of the above elements is discussed in this paper.

1.5 The work which can practically be undertaken by actuaries in the area of reinsurance bad debt provisions for companies transacting general insurance business is often restricted by:-

- data limitations
- time constraints
- budget constraints

A further factor to be taken into account by the actuary when considering how much work to undertake in this area is the level of materiality of reinsurance bad debts relative to the overall level of claim provisions.

Consequently, although theoretical considerations are felt by the working party to be very important, the paper concentrates less on what is theoretically ideal but practically impossible, and more on what is likely to be possible in practice given the constraints listed above.

1.6 Actuaries will need to use their professional judgement to decide how and to what extent the principles and methodologies described in this paper should be applied in any individual case.

2 THEORETICAL CONSIDERATIONS

- 2.1** Paragraph **1.5** draws attention to the limitations which frequently restrict the work which can practically be undertaken by actuaries in the area of reinsurance bad debts. However, it is instructive to consider the theoretical approach which an actuary might adopt if these limitations did not apply, and the actuary had unlimited data, time and budgets at his/her disposal. We consider it important that any practical approaches adopted by actuaries in the area of reinsurance bad debts should have a sound theoretical basis.

A theoretical approach

- 2.2** As with other aspects of reserving, there is no single formula or method that will always provide appropriate estimates of future reinsurance bad debts. The approach and assumptions used will depend on the nature of the inwards business and outwards protections and will incorporate the actuary's experience and judgement. Even if there was a single formula that always provided appropriate estimates, there would probably be other more approximate methods which would be equally reasonable in each individual circumstance.
- 2.3** The theoretical approach outlined below is a starting point that highlights some of the theoretical issues involved in the analysis and estimation of reinsurance bad debts. The whole theoretical process could include the following stages:-

- produce an estimate of gross ultimate claims split between:-
 - paid claims
 - reported case estimates
 - IBNR claims
 - IBNER claims
- allocate the IBNR and IBNER components to individual reported claims, and to an assumed claims distribution for claims not yet reported
- produce expected cashflow profiles in respect of each individual claim
- feed the gross claim projections, including cashflow projections, into a model of the outwards reinsurance programme, allowing for any currently unpaid reinsurance balances. This results in a cashflow profile of reinsurance recoverable for each outwards reinsurance contract split between
 - currently unpaid reinsurance balances
 - reported case estimates
 - IBNR/IBNER claims

This could involve stochastic as well as deterministic modelling

- for each outward reinsurance contract, identify the reinsurers providing the cover together with their percentage shares
- derive a cash flow profile of expected recoveries from each individual reinsurer

- calculate the probability of recoveries being made from each reinsurer at each future duration. This could be achieved in theory by undertaking a detailed stochastic asset liability modelling exercise for each individual reinsurer
- combine cash flows and probabilities for each individual reinsurer, and sum for all reinsurers to produce an estimate of future reinsurance bad debts.

2.4 Net paid claim development triangles produced by some companies only take credit for reinsurance recoveries to the extent that these have actually been received from reinsurers. The treatment of outstanding reinsurance recoveries in net incurred claim development triangles varies from company to company. In some cases expected reinsurance bad debts are offset against outstanding reinsurance recoveries, while in other cases there is no allowance for expected reinsurance bad debts. If net claim development triangles are adjusted to allow for reinsurance bad debts, then projected outstanding claims will also include some implicit allowance for future reinsurance bad debts, but probably not a sufficient allowance. It will be necessary for the actuary to:

- obtain an understanding of the treatment of reinsurance bad debts in net claim development triangles provided by the company
- assess whether or not the treatment of reinsurance bad debts in claim development triangles introduces an element of double-counting into the actuary's projections of future reinsurance bad debts. This assessment is likely to involve the application of professional judgement.

2.5 Other theoretical considerations which would need to be reflected in detail include:-

- principal-to-principal accounting offsets ("set-off"), including allowance for the different accounting treatments which apply in different jurisdictions
- allowance for disputes with reinsurers
- delays between gross claims being paid and reinsurance recoveries being received
- dividends from companies in liquidation
- reinstatement premiums payable when reinsurance recoveries are made
- bad debt risk for common account protections on inwards proportional treaties, where the nature and security of the common account protections may not be known by the cedant
- exposures to catastrophe risks. The approach adopted towards reinsurance bad debts in this area needs to be consistent with the approach adopted towards gross claim projections.

Is the theoretical approach a practical possibility?

- 2.6** The firm view of working party members is that the answer to this question is usually no.
- 2.7** The amount of data required to perform the calculations described in paragraph **2.3** would be vast, and would be much greater than the data required to estimate other components of a company's claim provisions which are likely to be of greater financial significance.
- 2.8** The time required to perform the calculations would be inconsistent with the tight reporting deadlines which are increasingly applicable in the general insurance market.
- 2.9** The cost involved would be disproportionately large in the context of a typical budget for a year end reserving exercise.
- 2.10** Perhaps the most compelling argument of all is that the complexity of the theoretical approach described above seems inappropriate in view of the substantial uncertainties involved and the likely difficulties in interpreting the results of such an exercise. In particular:-
- the gross claim projections underlying the methodology may be subject to considerable uncertainty
 - the allocation of IBNR/IBNER claims to individual reinsurance contracts will be subject to considerable uncertainty due to the range of possible claim distributions which may be fitted to the historical data
 - the probabilities of reinsurers defaulting will depend substantially on the macroeconomic assumptions which are fed into the stochastic asset liability model. It is difficult to incorporate qualitative factors such as management competence into such a model. However, management incompetence is a frequent cause of insolvency
 - details of the reinsurers may be unknown or incomplete owing to the role of brokers in placing and processing reinsurances
 - the historic experience of reinsurance insolvencies may not be a reliable guide to future experience.

A practical approach

- 2.11** Having discounted the theoretical approach as being impractical in most situations, it is necessary to determine a practical approach. However, we consider that it would be unwise to throw away the theoretical approach entirely. Any practical approach should have a sound theoretical basis.
- 2.12** We have therefore attempted to construct a practical approach which contains realistic proxies to each component of the theoretical approach described in paragraphs **2.3** to **2.5**, and this practical approach is described in Section 3.

3 A PRACTICAL APPROACH

3.1 As with the theoretical approach, members of the working party consider that there is no single practical approach that will always provide appropriate estimates of future reinsurance bad debts. The precise approach followed will depend on the circumstances of each individual company. In particular, the amount of work undertaken by the actuary in the area of reinsurance bad debts will depend on the materiality of the reinsurance bad debt provision in the context of the overall provisions of the company.

3.2 The practical approach may include some or all of the following stages:-

- produce estimates of ultimate claims, gross and net of reinsurance, split between:-
 - paid claims
 - reported outstanding claims
 - IBNR/IBNER claims
- analyse unpaid reinsurance balances by reinsurer and age of debt. This identifies the current major reinsurance debtors. Investigations into the underlying reasons for slow payment may provide insights into the likelihood of bad debts and the presence of disputes on these unpaid balances and on expected reinsurance recoverables
- analyse outstanding reinsurance recoveries (corresponding to gross reported outstanding claims excluding IBNR/IBNER) by reinsurer
- obtain a general understanding of the exposure of individual reinsurers to the company's reinsurance programme and facultative reinsurance arrangements, and the extent of diversification between different reinsurers. The following issues, for example, may be of particular interest:-
 - are the same reinsurers protecting the property and liability accounts?
 - are the same reinsurers represented on low level working layers and high level catastrophe protections?
 - are the same reinsurers protecting different years of exposure?
 - does the company have a particularly large exposure to one or more individual reinsurers?
- produce an estimated split of IBNR/IBNER recoveries by reinsurer. The method used to split such recoveries will depend on the general understanding obtained of the company's reinsurance protections. For example:-
 - if there is a tendency for the same reinsurers to participate in most protections and in similar proportions, it may be appropriate to apportion IBNR/IBNER claims by reinsurer in the same proportions as outstanding reinsurance recoveries
 - if different reinsurers protect the property and liability accounts, separate apportionments may need to be undertaken in respect of property and liability IBNR/IBNER claims
 - if different sets of reinsurers are on working layers and higher level covers, it may be appropriate to apply different ratios of IBNR/IBNER recoveries to reported outstanding recoveries for each set of reinsurers

- produce an estimated average duration of future reinsurance recoveries, including IBNR/IBNER recoveries, for various subdivisions of the company's business. These estimated average durations are likely to be derived on an approximate basis from cashflow projections corresponding to the estimates of ultimate claims, gross and net of reinsurance, referred to at the start of paragraph 3.2. Alternatively, the estimated average durations could be derived from benchmark cashflow projections based on the actuary's wider experience, however the actuary would need to be satisfied that such benchmarks are broadly appropriate. It may be necessary to produce separate estimated average durations for various subdivisions of the company's reinsurance protections. For example:-
 - different classes/groupings of business
 - working layers and higher level protections
 - different years
- allocate the company's reinsurers to security groupings based on:-
 - credit ratings produced by rating agencies, or
 - other methods where credit ratings are unavailable. The actuary may consider it appropriate to use other methods even when credit ratings are available. The allocation of reinsurers to security groupings is likely to involve the exercise of judgement.

Section 5 of this paper discusses the use of ratings produced by credit rating agencies to group reinsurers, while Section 6 discusses the approaches which the actuary might follow if credit ratings are unavailable or out of date

- estimate probabilities of groups of reinsurers defaulting on their obligations, based on:-
 - the security of each group
 - the estimated average duration of future recoveries for each group.

It will be necessary to determine separate probabilities for unpaid reinsurance balances and outstanding reinsurance recoveries. Section 7 of this paper discusses the assessment of these default probabilities

- estimate the likely percentage recovery from reinsurers who default on their obligations and go into liquidation. It is usual for significant recoveries to be obtained from such reinsurers, although these recoveries may be delayed very considerably. The assessment of recovery percentages is discussed in Section 8 of this paper

- apply default probabilities and assumed percentage non-recoveries (ie 1 - assumed percentage recoveries) to:
 - unpaid reinsurance balances
 - outstanding reinsurance recoveries including IBNR/IBNER

to produce estimates of future reinsurance bad debts for each grouping of reinsurers.

3.3 Working party members consider that the above practical approach is likely to be appropriate for many companies. However, particular circumstances may require the methodology to be modified to reflect, for example, some or all of the issues identified in paragraphs **2.4** and **2.5**. In particular:-

- the actuary will need to assess whether or not the treatment of reinsurance bad debts in claim development triangles introduces an element of double-counting into the actuary's projections of future reinsurance bad debts (see paragraph **2.4**)
- there will be some circumstances in which set-off will be a material factor. This may apply in particular when a company has a large exposure to one or two individual reinsurers. It may be necessary in such circumstances for the actuary to make an approximate allowance for set-off. The nature of the allowance will depend on the individual circumstances. In some cases, the company may be unable to produce a calculation of its full net-of-set-off position. In such cases, it could be argued that the actuary should give no credit, or only limited credit, for set-off.
- the company may be exposed to one or more disputes with reinsurers. It will be necessary for the actuary to discuss the nature of the disputes with the company, and to seek an understanding of the likelihood that the company's view will prevail. In some cases, such information may not be available to the actuary because the information is sensitive or subject to legal privilege, and the company may be concerned about legal issues of discovery. The actuary will then need to consider whether the outcome of the dispute is material relative to the overall quantum of the company's reserves.

3.4 There will also be some circumstances under which the actuary will feel it is necessary to move some of the way from the practical approach towards the theoretical approach. It is for this reason that the working party has attempted to achieve as much correspondence as possible between the components of the theoretical and practical approaches. The circumstances under which the actuary may wish to move further towards the theoretical approach might include the following:-

- the company's reinsurance protections are concentrated in a small number of reinsurers
- the actuary considers that future reinsurance bad debts are likely to be particularly material relative to other claim provisions, possibly because the company has a particularly heavy reliance upon reinsurance or because of the current position in the reinsurance pricing cycle
- the company has a material exposure to catastrophe losses. The issue here is whether or not the company's reinsurers are able to survive a major catastrophe
- the company's reinsurers have a material exposure to Year 2000 losses

Under these circumstances, the actuary may well also wish to undertake some sensitivity testing.

- 3.5** It is envisaged that the actuary will need to use a significant amount of professional judgement when undertaking many of the stages of the work.
- 3.6** It will be necessary for estimates of future reinsurance bad debts to be monitored against actual future experience.

4 DATA REQUIREMENTS

4.1 The actuary's data requirements in respect of reinsurance bad debts will depend on whether he/she is:-

- applying some or all of the components of the practical approach described in paragraph **3.2** without modification
- modifying the approach to reflect some or all of the issues identified in paragraphs **2.4** and **2.5**
- moving some of the way from the practical approach towards the theoretical approach as described in paragraph **3.4**.

4.2 If the actuary is applying the practical approach without modification or enhancement, the minimum data requirements would be:-

- full details of all reinsurance protections, including premium details and names and percentage shares of participating reinsurers
- unpaid balances split by:-
 - reinsurer
 - age of debt
 - year of origin
 - class of business (where appropriate)
 - currency
- outstanding reinsurance recoveries, excluding IBNR/IBNER, split by:-
 - reinsurer
 - year of origin
 - class of business (where appropriate)
 - currency
- details of any disputes with reinsurers.

These requirements are additional to the data required to review other components of the company's provisions.

4.3 If the actuary modifies the practical approach or moves towards the theoretical approach, data requirements will become more onerous. For example:-

- Appendix B contains a detailed data specification which would enable most of the components of the theoretical approach, described in Section 2, to be undertaken
- details of outstanding reinsurance recoveries could be split also by individual reinsurance contract
- details of the set-off position of monies due to each reinsurer might be requested from the company.

4.4 There is a wide variety of possible approaches to the request for data on reinsurance bad debts from companies. These include:-

- to request only the minimum data required to undertake the practical approach together with whatever modifications the actuary considers appropriate
- to request every item of data that the actuary considers might conceivably be relevant.

The working party was not unanimous on the choice of one of these approaches or somewhere in between. On balance, members tended towards requesting the minimum data rather than requesting every conceivable item. It was felt that a company might feel justifiably aggrieved if it produced large volumes of data that the actuary chose not to use. The amount of data requested may well depend on the circumstances of the company and the scope of the actuarial exercise to be undertaken, as outlined in paragraph **3.1**.

5 USE OF RATINGS PRODUCED BY CREDIT RATING AGENCIES

- 5.1** The practical approach described in Section 3 includes the allocation of reinsurers to security groupings based on credit ratings produced by rating agencies. We consider that, given the limitations described in paragraph 1.5, this is the most practical methodology available to enable actuaries to assess the security of individual reinsurers. The use of ratings produced by the major credit rating agencies has the advantages that:-
- it allows access to a large body of information including historic information concerning the proportions of companies within specific rating groups which have become insolvent within specified periods
 - such ratings are objective assessments of a company's security.
- 5.2** There are a number of different credit rating agencies which produce ratings on insurance and reinsurance companies. The principal of these are A M Best and Standard & Poor's, although ratings are also produced by Moody's and Duff & Phelps.
- 5.3** There are some issues arising because of the different rating structures used by the different agencies. The most appropriate conversion table of which we are aware is provided in Appendix C. Even if a like-for-like rating can be determined from, for example, Bests and Standard & Poor's, there will be instances where each will rate a company to be subject to different levels of security. In such cases, a decision would need to be made as to whether the actuary should take a "middle of the road" stance, or take one of the two ratings as being more appropriate. The choice of rating could be determined by whether or not there has recently been a favourable or unfavourable trend in the company's published credit ratings.
- 5.4** None of the agencies provides complete coverage of all insurance and reinsurance companies worldwide, although Standard & Poor's and A M Best provide ratings on virtually all US companies.
- 5.5** There is a risk that some ratings are only published on payment by the company concerned. This could give a distorted view of the market, as unrated companies will include those which consider the agency to have offered them a rating they consider inappropriately low.
- 5.6** The ratings are an imperfect measure of security, as they are based on performance tests, the results of which have an imperfect correlation with company failure. In spite of this, it is considered that the ratings are likely to be the most satisfactory practical means of assessing the risk of failure.
- 5.7** In general, a full set of ratings is unlikely to be provided more frequently than annually, although individual ratings are updated when specific events occur.
- 5.8** Where groups of insurance and reinsurance companies exist, the parent company may provide some form of guarantee in respect of recoveries due from subsidiary companies. The value to be placed on such guarantees is a non-trivial issue, but it is considered unlikely that an actuary would be able to provide a more expert assessment than is already included within the rating agency's assessment.
- 5.9** In view of the international nature of reinsurance business, it is necessary to compare reinsurers from different countries with different accounting and regulatory frameworks and using different base currencies. It is again considered unlikely that a significant improvement in evaluation could be introduced by an actuary by comparison with the assessment carried out by the rating agency

(including their actuaries) whose full-time function this is. It may, however, be appropriate to make a qualitative adjustment in respect of very recent developments, which may not yet be reflected in the latest credit agency ratings, although we understand that agencies normally amend their ratings within one or two months of becoming aware of any new problems.

- 5.10** There is likely to be some correlation between the failure of one company and others, in that they may be affected by the same events (e.g. unexpectedly severe catastrophes or a sharp fall in investment markets) and may be reliant on one another for reinsurance recoveries. Consequently, there is the possibility of a major event causing a "domino effect" and the insolvency of several reinsurance companies.
- 5.11** There may be some finite risk (or other) reinsurance where the reinsurer's basic security is backed by some form of collateral (e.g. letters of credit or security fund). It would appear appropriate to allow for this improvement in the security, when ranking reinsurers by security grouping. In the case of letters of credit, for example, the credit rating of the supporting bank may be used as a guide to the appropriate grouping. However, it should be borne in mind that the collateral would normally cover only the expected liability and not the exposure.
- 5.12** When considering the security afforded by Lloyd's syndicates, it may be appropriate to use the credit rating for the Lloyd's market as a whole, in view of the existence of the Central Fund.
- 5.13** Some companies may be exposed to a very large number of reinsurers. In such cases, it is not unusual to find, for example, that the top 20% of reinsurers represent 80% of the incurred reinsurance recoveries to date. In such cases, it may be appropriate to allocate the remaining 80% of reinsurers into a single security grouping or a small number of groupings, depending on the likely level of materiality of future reinsurance bad debts.

5.14 On occasions, there is a problem of identifying the company where the name of the company may have changed or be subject to alternatives in different languages. This may arise from:

- a simple change of name
- a change of name to reflect the sale of the company to a new owner
- the use of the local language and translation into English (Switzerland has particular problems in this connection in that the name may be in English, French or German)
- a change of name to distance perceptions of the company from problems or under-performance which may have occurred in the past
- the legal separation of business written in the past from business to be written in the future
- the reinsurer's participation in reinsurance pools.

6 WHAT IF CREDIT RATINGS ARE UNAVAILABLE OR OUT OF DATE?

- 6.1** In many cases the lack of a current credit rating may indicate that the company concerned is likely to provide "below average" security, as major reinsurers are likely to be subject to regular rating. However, if the company is new and has not yet reached the stage where the agency believes an appropriate rating can be assessed, the situation is rather different. Nevertheless, it may be that a company without any track record cannot be considered to be as secure as one with a number of years' satisfactory performance.
- 6.2** In an extreme case, it is conceivable that a reinsurer does not have a rating because it does not exist!
- 6.3** The materiality of exposure to companies with no current rating needs to be taken into account. It may be that detailed investigation or analysis is inappropriate in view of the relative immateriality of the exposure to the possible failure of the unrated company.
- 6.4** If the materiality is significant, some form of grading is still likely to be necessary. This may be based on information provided by the rating agencies, who analyse the data for many companies even if they do not provide a credit rating. A list of the principal factors likely to affect the security of reinsurers is provided in Appendix D.
- 6.5** A particular issue exists where neither a rating nor the data on which to rate the company is available. The lack of an up-to-date rating may be correlated with the onset of problems with the security of the company. The actuary will need to use his/her judgement to form a view, based on whatever information is available and taking account of the factors listed in Appendix D.

7 ASSESSMENT OF DEFAULT PROBABILITIES

7.1 The probability of a reinsurer going insolvent, and hence defaulting on its obligations, is dependent on many factors. It will not be possible to incorporate all of these into a practical model, but the percentage chosen should reflect a true assessment of the underlying risk. The chief factors are:-

- *Financial soundness of the reinsurer.*

An assessment of this can be made either by using credit ratings published by rating agencies (see Section 5) or by undertaking other investigations when such ratings are unavailable (see Section 6). We discuss in paragraphs 7.2 to 7.5 how such ratings might be converted into default probabilities.

- *Duration of business.*

Most reinsurers would be on an 'approved' list when reinsurance business is placed, but recoveries may be made many years after the contract has been written. The longer the period from inception to recovery, the higher the cumulative probability of the reinsurer becoming insolvent. This is illustrated by the table in Appendix G, which shows the cumulative default rates of bonds with different ratings over several years. These are derived from a study undertaken by Moody's into corporate bond defaults and default rates over the period 1970 to 1998. Although the table is not based on reinsurance defaults, we consider it is still of interest and value. The table suggests that the relationship between cumulative default percentages and time is not necessarily linear. The issue of duration is considered in more detail in paragraphs 7.6 to 7.8.

- *Type of business.*

The type of business written by the reinsurer would affect the volatility of the results and hence probabilities of default. Some allowance might be made for this in the factors chosen. However, information may not be available on the reinsurer's mix of business and exposures. Some allowance might be made for this by considering the cedant's book, which is subject to the reinsurance cover, to be a proxy for the reinsurer's book, however care should be taken to ensure that such an approach is appropriate. For example, catastrophe business requires careful consideration as it is a short-tail class but susceptible to substantial variations in claims experience. The time when insurers are seeking recoveries from catastrophe reinsurers is exactly the time when the reinsurers' solvency position is most likely to be under pressure.

- *Insurance/reinsurance pricing cycle and economic cycle.*

These are factors which are common to all or most reinsurers, given that rating trends and economic conditions are often strongly correlated across different jurisdictions. History suggests that the incidence of insurance/reinsurance insolvencies is correlated closely with the position in the pricing cycle. This is considered in more detail in paragraphs 7.9 and 7.10.

Financial soundness of the reinsurer

7.2 The working party would like to draw attention to four sources of data which may assist actuaries when converting credit ratings into default probabilities:-

a note on reinsurance recoverables credit risk which was produced by Standard & Poor's in January 1997 (see Appendix E). This includes details of the derivation from historical data of default rates in respect of reinsurance recoverable credit risk for each rating category. We recommend that the reader studies the entire note, which was also discussed at a 1997 General Insurance Convention workshop. The working party has been unable to establish the precise definition of the "charge factors" mentioned in the note, although we understand they allow for partial recoveries from liquidated companies.

The default rates are derived from Standard & Poor's database of bond defaults and insurance company insolvencies

- tables produced by Standard & Poor's in January 1998 containing cumulative default rates and time to default by rating category (see Appendix F). We understand these tables are not specific to the insurance industry. The working party is aware that the January 1998 study has been updated by Standard & Poor's, but has not yet been able to obtain a copy of the updated study
- a study undertaken by Moody's into corporate bond defaults and default rates over the period 1970 to 1998 (see Appendix G). Although Moody's only provide a limited coverage of the insurance sector, the default rates may be applied to equivalent credit ratings used by Bests or Standard & Poor's
- various graphs published by Swiss Re in their July 1995 Sigma publication showing:-
 - numbers of insurance insolvencies and the insolvency rate during the period 1978 to 1994 in the US and UK markets
 - the relationship of insurance company insolvencies to profitability, worldwide insured catastrophe losses and interest rates.

These graphs are shown in Appendix H. Although the graphs are for the whole market and not for individual rating categories, they provide a broad reasonableness check on the Standard & Poor's and Moody's analyses, as well as providing an indication of the percentage increase in default rates which may be expected when general market conditions are adverse.

A possible alternative approach is to derive default probabilities from the differential in yields between corporate bonds and risk-free investments for each rating category. Details of yield differentials can be found in the Bondweek publication (see Bibliography). However, it should be borne in mind that yield differentials may fluctuate significantly within relatively short time periods, depending on changes in investment conditions. This approach is based on the assumption that the security of corporate bonds can be used as a proxy for the security of reinsurance companies.

- 7.3** It appears that the Standard & Poor's, Moody's and Swiss Re analyses are not obviously inconsistent with each other, and could therefore form the basis of default percentages. However, it should be borne in mind that such an approach implies that past experience is a reasonable guide to future experience. It should also be borne in mind that the Standard & Poor's and Moody's analyses are based on bond default rates for all market sectors, and not just the insurance market. Furthermore, there may not necessarily be a very strong correspondence between bond defaults and insurer/reinsurer insolvency. We also suspect that the results of the Standard & Poor's and Moody's analyses have been smoothed to some extent. The selection of default percentages is likely to involve the exercise of judgement.
- 7.4** Some adjustment to these default percentages may be considered appropriate when there is a favourable or unfavourable trend in credit ratings over the last few years.
- 7.5** The Standard & Poor's and Moody's studies suggest that the probability of companies rated AAA defaulting on their obligations during the next 10 years is non-zero. With this in mind, we consider that the default probabilities for all reinsurers should be greater than zero, irrespective of the size of the company. We appreciate that this will require careful explanation and justification to company management.

Duration of business

- 7.6** As has been explained above, the longer the period from inception to recovery, the higher the cumulative probability of the reinsurer becoming insolvent. This suggests that different default probabilities should be applied for short-tail and long-tail business.
- 7.7** The Standard & Poor's, Moody's and Swiss Re data can be used to produce default probabilities for each rating category.
- 7.8** These individual year default probabilities can be applied to:-
- future cashflow projections of reinsurance recoveries for each class of business, or
 - average durations for each class of business. It should be borne in mind that average duration of outstanding reinsurance recoveries will vary by year of account, and that the average duration of reinsurance recoveries may well be longer than the average duration of the corresponding gross claims, or
 - benchmark average durations based on the actuary's wider experience, however the actuary will need to be satisfied that such benchmarks are appropriate.

Pricing and economic cycles

- 7.9** Reductions in profitability can lead, albeit with some delay, to an increase in the number of insolvencies. The implication would be that when the market is soft this will decrease profitability and have a knock-on effect on solvency. This might be more important where the recoveries are expected only over a short period, whereas with longer-tail classes an averaging would take place. Sometimes, when reinsurance rates are soft, reinsurers purchase a larger volume of retrocessional cover, thus increasing the likelihood of a "domino effect" (see paragraph **5.10**) of reinsurance company insolvencies. An allowance could be made for soft markets by increasing the default probabilities to allow for this effect.
- 7.10** Similarly, in the past when interest rates have fallen, insolvencies have tended to increase. An allowance could be made for this effect. There are two opposing factors at work. If interest rates rise then assets fall in value, reducing solvency especially if assets have to be sold to pay claims. However high interest rates give high income from investments improving cashflow. If interest rates fall, cashflow is squeezed and the risk to solvency is increased. It appears from the Swiss Re analyses that the second effect is more significant.

Other comments

- 7.11** Care should be taken to avoid double-counting in the assessment of default percentages. It is possible to apply percentages based on the rating agencies' analyses, and then make additional allowance for known risks, which may already be reflected in these analyses. Under some circumstances, this could result in the over-estimation of future reinsurance bad debts.
- 7.12** If a company has a particularly large exposure to one or two reinsurers, we consider there is a reasonably strong argument that the default percentages attributable to these individual reinsurers should be increased to reflect the concentration of risk. The assessment of the increase required will largely be a matter of judgement for the individual actuary.
- 7.13** It is worth noting that companies can be pro-active in reducing actual default percentages by adopting a policy of judicious commutation of selected reinsurance contracts.

8 ASSESSMENT OF RECOVERY PERCENTAGES

- 8.1** The fact that a reinsurer becomes insolvent does not usually mean that the creditors will not receive anything. Ultimately, they are likely to receive a proportion of their claims, often expressed as a percentage or as a number of pence to be received for each pound owed. Failure to allow for this when setting bad debt provisions will cause the provisions to be overstated.
- 8.2** Obtaining data on ultimate recovery percentages for insolvent reinsurers is difficult. The percentages paid to date are often publicly available but this is seldom the case with the anticipated ultimate percentages. A selection of paid recovery percentages is shown in Appendix I. It should be noted that ultimate recovery percentages will, in many cases, be substantially higher than paid recovery percentages.
- 8.3** Clearly, the paid and anticipated ultimate percentages will be virtually identical for any insolvent reinsurers whose liabilities are close to being fully run-off. Such companies are likely to have become insolvent some time ago. However, such percentages may still have some relevance to reinsurance bad debt provisions. The underlying reinsurance market regulatory environment and the reasons why companies fail are probably broadly similar across the decades, although there may have been some improvements in regulation in some jurisdictions. We suspect that average ultimate recovery percentages probably remain of a similar order of magnitude over time.
- 8.4** Research into a random selection of companies which have become insolvent more recently indicated that very few had publicly released any information on their expected ultimate recovery percentages. In addition, where the information is not already in the public domain, the liquidators are unwilling to release it. Consequently, our limited investigations yielded only two examples of expected ultimate recovery percentages, which are as follows:
- Bermuda Fire and Marine: 20% - 30%
 - KWELM: 30% - 50%
- 8.5** Where an individual syndicate is a creditor of an insolvent reinsurer, it may have access to the expected ultimate recovery percentage, even if this figure is not in the public domain.
- 8.6** Historical experience indicates that ultimate recovery percentages tend to be within the range 20% to 60%, although there are a few examples which have fallen outside this range.
- 8.7** A possible alternative approach is to consider average recovery rates as measured by defaulted bond prices. Moody's Investors Service reported in January 1999 that average recovery rates for corporate bonds, measured on this basis, had fallen to 45% of par from 54% a year previously, but remained above their post-1970 average of 41% of par.
- 8.8** A recovery percentage needs to be selected for each reinsurer protecting the company under review. For reinsurers which are already insolvent, the percentage selected should, where possible, be based on information that is in the public domain. However, as discussed above, such information is unlikely to be available in many cases.

8.9 For reinsurers which are not currently insolvent, or those which are insolvent but for which there is no publicly available information, a percentage will need to be estimated. If there are any reinsurers whose solvency is particularly significant to the company then it would be sensible to consider them separately. In all other cases, the best approach would probably be to select average recovery percentages. Either the same average could be chosen for all reinsurers, or the reinsurers could be divided into groups and different averages selected for each group. One possible way of grouping the reinsurers would be to use the same groups as for the default probabilities. This may well mean grouping them according to their current credit ratings. On balance, working party members consider that, unless there are exceptional circumstances, it would be appropriate to use the same assumed recovery percentage for all solvent reinsurers.

8.10 The recovery percentages could be incorporated into the calculation of the bad debt reserves in one of two ways:

- a. as a reduction in the probability of default; or
- b. as a percentage that will be unrecoverable if default does occur.

Either approach would seem to be perfectly acceptable.

8.11 If it takes a long time for an insolvent reinsurer to pay claims, this will increase the future administration costs of the company and could introduce borrowing costs. Obviously, the timing of recoveries may be a highly material issue from a commercial perspective.

Appendix A: Select bibliography

- 1** Report of reinsurers security working party by D M Hart et al (1990 GISG).
- 2** "What ratios really matter?" by J W Dean et al (1993 General Insurance Convention, pages 209 - 236).
- 3** Workshop session: rating agencies by K Felisky-Watson et al (1995 General Insurance Convention, pages 301 - 310).
- 4** "Reinsurance Security" by D E A Sanders et al (1996 General Insurance Convention, pages 179 - 204).
- 5** Workshop session: analysis of reinsurance security by R A Shaw and F J Mackie (1997 General Insurance Convention, page 61). See Appendix E.
- 6** Swiss Re, Sigma No 7-1995: Development of insolvencies and the importance of security in the insurance industry.
- 7** Note by Standard & Poor's on the assessment of credit risk (see Appendix E) - The Review, January 1997.
- 8** Bondweek.
- 9** Ratings Performance 1997 – Stability and Transition – January 1998 – Standard & Poor's.
- 10** Historical Default Rates of Corporate Bond Issuers, 1920 - 1998 - January 1999 - Moody's Investors Service.

Appendix B: Some possible data requirements for the theoretical approach

Contents of appendix

B1. Description of data required

- B1.1 FGU (from ground up) loss details
- B1.2 Claims bordereaux/statements
- B1.2 Event codes
- B1.4 Unpaid balances
- B1.5 Security table

B2. Data table specifications

- B2.1 FGU loss details - (not required for proportional contracts)
- B2.2 Claims bordereaux/statements
- B2.3 Event codes - (not required for proportional contracts)
- B2.4 Unpaid balances
- B2.5 Security table
- B2.6 Reinsurer security table

B3. Other data

- B3.1 Contract details
- B3.2 Premium details

B4. Other contracts

B5. Past disputes

Appendix B cross-refers to paragraph 4.3 of the paper.

B1. Description of Data Required

Data specifications for all of the following can be found in sections B2 & B3, and should be subdivided by currency, where appropriate. The following data is in electronic format.

B1.1 FGU (From Ground Up) Loss Details

FGU loss details are required for all loss events, broken down by class, underwriting year and currency on both a paid and outstanding basis.

B1.2 Claims Bordereaux / Statements

Detail of paid and outstanding claims by event, contract and section.

B1.3 Event Codes

A complete event code table is required. This table contains for each event code the date of loss and description.

B1.4 Unpaid Balances

This information is required in order to produce complete statements for individual reinsurers.

B1.5 Security Table

A security table is required for each contract.

B2. Data Table Specifications

B2.1 FGU Loss Details – (Not Required for Proportional Contracts)

Description

Event Code
Contract Reference
Section Code
Underwriting Year
Business Type Code
Reinsurance Programme Mapping Code
Paid FGU Claims
Outstanding FGU Claims

B2.2 Claims Bordereaux / Statements

Description

Contract reference
Section Code
Cover note reference
Broker code
Event code
Funds withheld
Letters of Credit
Contribution of claim to agg deductible (Not required for proportional contracts)
Paid amount of claim
Outstanding claim reserve

B2.3 Event Codes – (Not required for proportional contracts)

Description

Event Code
Loss description
Date of loss
Special claim indicator
Type of business code

B2.4 Unpaid Balances

Description

Internal reinsurer code
Broker code
Contract reference
Section code
Pool indicator
Broker reference
Balance outstanding

B2.5 Security Table

Description

Contract reference
Section code
Internal reinsurer code
Broker order percentage
Reinsurer proportion (of order %)
Pool code
Broker alpha code
Broker reinsurer reference
Lead underwriter indicator

Commuted indicator
Pool indicator

B2.6 Reinsurer Security Table

Description

Internal reinsurer code
Bad debt proportion on unpaid balances
Bad debt proportion on O/S reserves
Bad debt proportion on IBNR reserves
*Security rating at Dec '97
*Security rating at Dec '96
*Security rating at Dec '95
*Security rating at Dec '94
*Security rating at Dec '93

* Plus any relevant rating agency information i.e. Standard & Poor's, A M Best.

B3. Other Data

The following table definitions are included for completeness

B3.1 Contract Details

Description	Comments
Contract reference	
Section code	Used for different contract sections - eg Top & Drops
Broker reference	
Broker account code	
Main class of business	
Sub class of business	
Type of contract	
Contract description	
Underwriting reference	
Main broker	
Proportion of whole placement	
Amount actually placed	
Broker order percentage	
Coinsurance percentage if not 100% placed	
Inception date of contract	
Expiry date of contract	
Excess point	(Not required for proportional contracts)
Each and every loss limit	(Not required for proportional contracts)
Aggregate deductible	(Not required for proportional contracts)
Aggregate limit	(Not required for proportional contracts)
Claim rate of exchange	
Presentation sequence of claims	
No of reinstatements – 1	(Not required for proportional contracts)
No of reinstatements – 2	(Not required for proportional contracts)
No of reinstatements – 3	(Not required for proportional contracts)
No of reinstatements – 4	(Not required for proportional contracts)
No of reinstatements - unlimited	(Not required for proportional contracts)
Cost of reinstatements - 1	(Not required for proportional contracts)
Cost of reinstatements - 2	(Not required for proportional contracts)
Cost of reinstatements - 3	(Not required for proportional contracts)
Cost of reinstatements - 4	(Not required for proportional contracts)
Cost of reinstatements - unlimited	(Not required for proportional contracts)
Reinstatement rate of exchange	(Not required for proportional contracts)
Security approved	

B3.2 *Premium Details*

Description	Comments
Contract reference	
Section Code	
Premium rate on adjustable contracts	(Not required for proportional contracts)
Rate of exchange for premiums from slip	
Net premium income	
Estimated premium income	
Flat Premium	(Not required for proportional contracts)
Minimum & Deposit premium	(Not required for proportional contracts)
Deposit premium	(Not required for proportional contracts)
Adjustment premium	(Not required for proportional contracts)
Reinstatement rate of exchange	(Not required for proportional contracts)

B4. **Other Contracts**

Any relevant information with regard to facultative covers, surplus covers, financial reinsurances (i.e. time and distance, A.R.T, prospective and retrospective covers etc). In particular, all details in respect of commutation/sunset clauses.

B5. **Past Disputes**

Any relevant information with regard to past disputes with reinsurers, which have now been resolved.

Appendix C: Comparison of individual agencies' rating categories

Comparison of individual agencies' rating categories							
		Standard & Poor's ¹		A M Best ²		Moody's ¹	
secure	1	AAA	extremely strong	A++	superior	Aaa	exceptional
	2	AA+, AA, AA-	very strong	A+	superior	Aa1, Aa2, Aa3	excellent
	3	A+, A, A-	strong	A, A-	excellent	A1, A2, A3	good
	4	BBB+, BBB, BBB-	good	B++, B+	very good	Baa1, Baa2, Baa3	adequate
vulnerable	5	BB+, BB, BB-	marginal	B, B-	fair	Ba1, Ba2, Ba3	questionable
	6	B+, B, B-	weak	C++, C+	marginal	B1, B2, B3	poor
	7	CCC	very weak	C, C-	weak	Caa	very poor
	8	R, (U,S) ³	extremely weak	D	poor	Ca	extremely poor
	9			E, F	under state supervision/in liquidation	C	
	10			S	rating suspended		
	11			NR 1- 5 ³	not rated		

- 1) Letters followed by a plus or minus sign (S&P's) and the figures 1, 2 and 3 (Moody's) are not separate rating categories but indicate whether a company is located in the upper, middle or lower third of a rating category.
- 2) Besides the rating symbols indicated, A.M.Best also uses rating modifiers - letters which give additional information on the rating (see below).
- 3) The figures 1 to 5 indicate why no rating was assigned.

Explanatory notes to Best's Ratings

Not rated categories

- NR-1 Insufficient data
- NR-2 Insufficient size and/or operating experience
- NR-3 Rating procedure inapplicable
- NR-4 Company request
- NR-5 Not formally followed

Rating modifiers

- g Group Rating, i.e. on basis of consolidated data
- p Pooled Rating, for companies who pool 100% of their business
- r Reinsured Rating, reinsurer's rating when virtually all of the company's business is ceded
- u Under review

Source: A.M.Best

Information taken from "Swiss Re, sigma No. 7/1995", and amended based on comments from Standard & Poor's and A M Best. It should be noted that any comparison of individual agencies' rating categories involves an element of subjective judgement.

Appendix C cross-refers to paragraph 5.3 of the paper.

Appendix D: Principal factors likely to affect the security of reinsurers

Domicile

Currency

Capitalisation and solvency ratios

Profitability, current and projected

Industry trends in premium rates, etc

Growth rate

Changes in mix of business

Management competence and integrity

Strength of technical provisions

Security, adequacy and extent of retrocessional protections

Aggregations of exposure to inwards claims

Quality and spread of assets

Liquidity

Ownership (including any guarantees)

Involvement with intermediaries

Quality of record-keeping and data management

Appendix D cross-refers to paragraph 6.4 of the paper.

Appendix E: Note by Standard & Poor's on the assessment of credit risk

The following note was produced by Standard & Poor's in January 1997. It includes details of the derivation from historical data of default rates in respect of reinsurance recoverables credit risk for each rating category. We recommend that the reader studies the entire note. The working party has been unable to establish the precise definition of the "charge factors" mentioned in the note, although we understand they allow for partial recoveries from liquidated companies.

The ability of reinsurance to help an insurer improve its underwriting results, lower catastrophic risk, bolster its ability to write new business, and fortify solvency margins and capital position, play an integral role in the evaluation of the financial strength of the insurer. Yet, the ceding of premiums to a vulnerable reinsurer can have serious implications for an insurer. Indeed, the credit risk associated with reinsurance recoverables is one of the largest risks faced by many property/casualty companies, especially those engaged in significant longer-tailed liability business.

The analysis of this risk is an area where Standard & Poor's (S&P) can draw upon its worldwide experience to analyse a primary company's reinsurance portfolio. In fact, of 140 professional global reinsurers, at August 1996, S&P had rated 126 companies. Although the reinsurance industry is for the most part secure, S&P estimates that 4.5% of the US insurance industry's recoverables are at risk (1.02% of aggregated surplus). Moreover, some insurers have a more significant amount of exposure to uncollectible reinsurance recoverables. This is primarily due to a cursory selection of reinsurers based solely on price or capacity in years gone by, and is aggravated by a modest capital position.

S&P's capital adequacy model is the primary tool to help evaluate an insurer's capital adequacy. In recognition of the reinsurance recoverable risk, the model charges available capital for potentially uncollectible reinsurance, much as S&P assesses capital charges for investments in bonds with default risk. In the case of bonds, S&P uses credit ratings of those bonds to gauge default risk, whereas, for reinsurance recoverable, claims-paying ability ratings are used to assess an insurer's vulnerability to reinsurer default risk.

The ability to discern more precisely the impact of a foreign or domestic reinsurer's solvency on a primary re/insurer's financial strength will improve the ratings process with regard to S&P's evaluation of the capital strength of all companies. The US National Association of Insurance Commissioner's risk based capital formula uses a flat 10% charge to assess an insurer's credit risk from uncollected reinsurance recoverables. The drawback of a flat charge is that a prudent company's true vulnerability to uncollectible reinsurance could be erroneously overstated, while a less prudent company's exposure could be understated. By assessing capital according to the company's reinsurance portfolio, the reinsurance recoverable asset will be modified by an allowance for uncollectible reinsurance based on the credit quality of the reinsurer.

S&P will be using the following reinsurance recoverable charges, based on the rating of the reinsurer:

Rating of reinsurer	Charge factor
AAA, AAAq or AAA _{ISI}	.005
AA, AAq or AA _{ISI}	.012
A, Aq or A _{ISI}	.019
BBB, BBBq or BBB _{ISI}	.047
BB, BBq or BB _{ISI}	.096
B, Bq or B _{ISI}	.238
CCC, CCCq or CCC _{ISI}	.497
NR or U _{ISI}	.250
R or S _{ISI}	.500

Each charge factor is applied to the total reinsurance recoverable balance collectible from reinsurers rated in each category. S&P defines the recoverable balance as ceded loss reserves (case and IBNR), loss adjustment expense reserves, unearned premium reserves, and contingent commission reserves, less ceded balances payable, other amounts due to reinsurers, any reinsurer funds held by the insurer, and letters of credit. The sum of the products of charge factors times recoverable balances is S&P's estimate of the required capital to support the company's recoverable risk.

The charge factors are derived from S&P's databases of bond defaults and insurance company insolvencies. Historical analysis of hundreds of corporate bond defaults for the 15-year period ending in 1995 confirms that higher-rated issues default less frequently than lower-rated issues. For example, the 15-year default rate for bonds rated AAA was 1.4%, while for BBB rated issues the rate was nearly 31%. To apply these corporate default rates to insurance insolvency expectations S&P combined the experience of the corporate bond and insurance markets.

S&P uses a 10-year horizon as the period for which an insurer should hold capital against possible reinsurance collection problems (the same horizon used in S&P's assessment of default risk on insurers' bond investments). Second, S&P correlates the bond default experience with the insurance insolvency experience. S&P then extrapolates expected 10-year insolvency rates for each rating category. Finally, the expected insolvency rates are modified to reflect the fact that partial recovery can be made through commutations prior to insolvency or through litigation after the fact. S&P also recognise that insurers may realise slow or reduced payments from weak reinsurers even if insolvency does not occur.

There are limitations that prohibit a perfectly accurate assessment of an insurer's true reinsurance recoverable risk. Among these are:

- recoverables for catastrophe reinsurance are reported only when an event occurs, making it impossible to quantify an insurer's risk to weak catastrophe reinsurers
- the assessment of the risk is dependent on the insurer's estimate of ceded reserves - if an insurer's reserves are deficient it is possible that the deficiency also exists in the ceded reserves, and recoverable balances are not available on a line-of-business basis, nor in terms of limits and attachments points for each reinsurer.

S&P - Reinsurance recoverables credit risk

S&P Property / Casualty Capital Adequacy Model

The S&P's capital adequacy model is a significant part of the analysis of the capital strength of a Property / Casualty insurer or reinsurer. The model compares total adjusted capital less realistic expectations of potential investment losses and credit losses against a base level of surplus appropriate to support ongoing business activities at a secure rating level ("BBB").

This calculation produces a "Capital Adequacy Ratio". An insurer's capital strength is viewed as adequate if its capital adequacy ratio is at least 100%. The capital adequacy ratio is only a reference point. Qualitative and quantitative enhancements are applied as warranted to derive a more complete picture.

S&P's Capital Adequacy Ratio

$$\frac{\text{Total adj Capital} - \text{Asset-related risk charges} - \text{Credit-related risk charges}}{\text{Underwriting risk} + \text{Reserve risk} + \text{Other business risk}}$$

Evaluation of credit risks

S&P uses Financial Security Ratings of reinsurers to assess an insurer's vulnerability to reinsurer default risk. The reinsurance recoverable charges vary according to the rating of the reinsurer. The NAIC's RBC formula uses a flat 10% charge to assess an insurer's credit risk from uncollected reinsurance recoverables, the disadvantage of this is that a prudent company's true vulnerability would be overstated, with a less prudent company's exposure being understated.

Reinsurance recoverables - credit risk charges

Rating	Factor	Rating	Factor
AAA	0.5%	S	50%
AA	1.2%	NR	25%
A	1.9%	R	50%
BBB	4.7%	Premiums and agent's balances in course of collection	2%
BB	9.6%	Premiums and agent's balances not yet due	2%
B	23.8%	Accrued retrospective premiums	2%
CCC	49.7%	Interest, dividends and real estate income due & accrued	1%
U	25.0%	Receivables from parent, subsidiaries and affiliates	5%

Each Charge Factor is applied to the total reinsurance recoverable balance collectible from reinsurers in each category.

$$\begin{aligned}
\text{Recoverable Balance} = & \text{Ceded Loss Reserve (Case + IBNR)} \\
& + \text{Loss Adj Expenses} \\
& + \text{Unearned premium Reserves} \\
& - \text{Ceded balances payable} \\
& - \text{Other amounts due to reinsurers} \\
& - \text{Reinsurers funds held by the insurer} \\
& - \text{Letters of Credit}
\end{aligned}$$

The sum of the products of charge factors times recoverable balances is S&P's estimate of the required capital to support the company's recoverable risk.

Derivation of reinsurance recoverables charge factors

Bond defaults

These are derived from S&P's database of bond defaults and insurance company insolvencies. Hundreds of corporate bond defaults for the 15 year period from 1981 to 1995 were analysed resulting in the calculation of default rates by duration, up to a maximum of 15 years.

Conclusions are:

- 1 The lower the rating the higher the average cumulative default rate for 1981 - 1995.

15 year default rates

AAA	1.4%	BBB	4.7%	CCC	45.1%
AA	1.5%	BB	19.9%		
A	3.0%	B	30.7%		

- 2 The lower the rating the shorter the average time to default.

Time to default (years)

AAA	8.0	BBB	6.4	CCC	2.9
AA	7.4	BB	5.0		
A	7.7	B	3.7		

Reinsurance recoverables charge factors

- A 10-year horizon is assumed as the period for which an insurer should hold capital against possible reinsurance collection problems.
- The Bond default experience is then correlated against the insurance solvency experience.
- Expected 10-year insolvency rates are extrapolated for each category.
- The expected insolvency rates are modified to reflect that partial recovery can be made through commutations or through litigation.
- Recognition is given to the fact insurers may realise slow or reduced payments from weak reinsurers even if insolvency does not occur.

Limitations

The limitations to an accurate assessment of an insurers' true reinsurance recoverable risk are:

- recoveries for catastrophes are reported only when an event occurs
- assessment of the risk is dependent on the insurer's estimate of ceded reserves
- recoverable balances are not available on a line-of-business basis
- recoverables are not available in terms of limits and attachment points for reinsurers.

Appendix E cross-refers to paragraph 7.2 of the paper.

Source

The Review, January 1997

Standard & Poor's

Appendix F: Default rates and times to default produced by Standard & Poor's

Time to Default by Rating Category					
Original rating	Defaults (units)	Avg. years from orig. rating	Last rating prior to D	Defaults (units)	Avg. years from last rating
AAA	3	8.0	AAA	0	N.A.
AA	9	7.4	AA	0	N.A.
A	23	7.6	A	0	N.A.
BBB	36	6.6	BBB	7	1.8
BB	146	5.1	BB	22	3.1
B	233	3.7	B	192	1.9
CCC	38	3.2	CCC	267	0.6
Totals	488	4.6	Totals	488	1.3

N.A. – Not applicable

Static Pool Average Cumulative Default Rates (%)															
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15
AAA	0.00	0.00	0.06	0.12	0.19	0.35	0.52	0.82	0.93	1.06	1.06	1.06	1.06	1.06	1.06
AA	0.00	0.02	0.10	0.20	0.35	0.53	0.70	0.84	0.91	1.00	1.05	1.11	1.11	1.11	1.11
A	0.05	0.14	0.24	0.39	0.58	0.77	0.97	1.22	1.49	1.76	1.99	2.09	2.17	2.23	2.30
BBB	0.18	0.42	0.67	1.21	1.68	2.18	2.66	3.07	3.38	3.71	3.94	4.06	4.13	4.21	4.21
BB	0.91	2.95	5.15	7.32	9.25	11.22	12.29	13.40	14.33	15.07	16.02	16.44	16.76	16.76	16.76
B	4.74	9.91	14.29	17.42	19.70	21.26	22.56	23.75	24.71	25.55	26.03	26.31	26.43	26.43	26.43
CCC	18.90	26.01	30.99	35.10	39.02	39.88	40.87	41.17	41.86	42.72	42.72	42.72	42.72	42.72	42.72
Inv															
grade	0.07	0.18	0.31	0.54	0.78	1.05	1.31	1.58	1.79	2.02	2.19	2.28	2.34	2.38	2.41
Spec															
grade	3.75	7.60	11.03	13.79	16.03	17.72	18.90	20.00	20.93	21.73	22.40	22.74	22.96	22.96	22.96

Appendix F cross-refers to paragraph 7.2 of the paper.

Source: Standard & Poor's, Ratings Performance 1997 -
Stability & transition – January 1998

Appendix G: Default probabilities - Moody's**Average Cumulative Default Rates by Letter Rating from 1 to 20 Years (Percent) - 1970-1988**

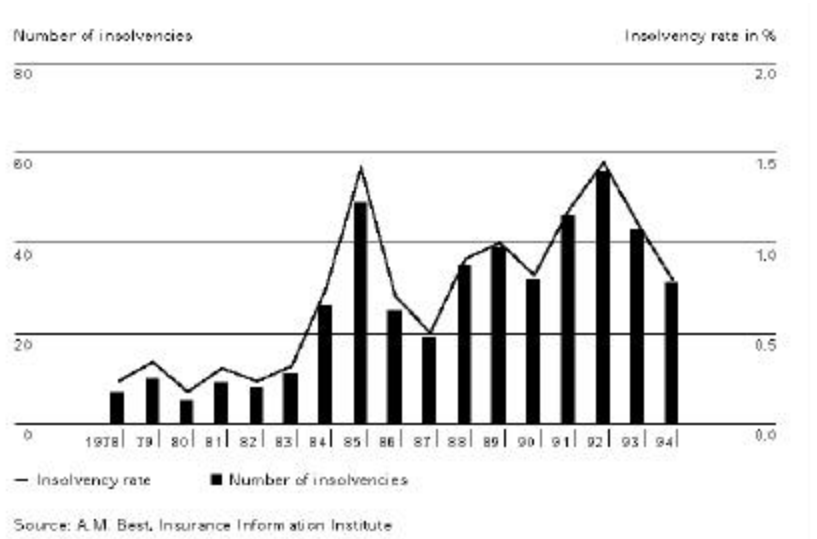
Years:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	0.00	0.00	0.00	0.04	0.14	0.24	0.35	0.47	0.61	0.77	0.94	1.13	1.35	1.47	1.59	1.73	1.88	2.05	2.05	2.05
Aa	0.03	0.04	0.09	0.23	0.36	0.50	0.64	0.80	0.91	0.99	1.08	1.18	1.30	1.56	1.63	1.72	1.92	2.04	2.17	2.32
A	0.01	0.06	0.20	0.35	0.50	0.68	0.85	1.05	1.29	1.55	1.81	2.09	2.35	2.56	2.86	3.19	3.52	3.86	4.24	4.45
Baa	0.12	0.38	0.74	1.24	1.67	2.14	2.67	3.20	3.80	4.39	5.04	5.71	6.35	7.02	7.72	8.46	9.19	9.88	10.44	10.89
Ba	1.29	3.60	6.03	8.51	11.10	13.37	15.20	17.14	18.91	20.63	22.50	24.54	26.55	28.21	29.86	31.70	33.28	34.66	35.88	36.99
B	6.47	12.77	18.54	23.32	27.74	31.59	35.04	37.97	40.70	43.91	45.98	47.25	48.53	49.69	51.07	52.20	52.90	52.90	52.90	52.90
Investment-Grade	0.05	0.15	0.33	0.58	0.81	1.06	1.34	1.63	1.94	2.27	2.62	2.99	3.35	3.72	4.10	4.52	4.95	5.36	5.73	5.99
Speculative-Grade	3.82	7.69	11.27	14.44	17.49	20.14	22.33	24.46	26.38	28.32	30.16	31.96	33.74	35.23	36.74	38.36	39.73	40.87	41.87	42.80
All Corp.	1.15	2.30	3.37	4.33	5.21	5.99	6.66	7.31	7.93	8.55	9.17	9.77	10.37	10.91	11.47	12.07	12.65	13.16	13.62	13.98

Appendix G cross-refers to paragraphs 7.1 and 7.2 in the paper. Source: Historical Default Rates of Corporate Bond Issuers – 1920-1998 – January 1999 – Moody's Investors Service.

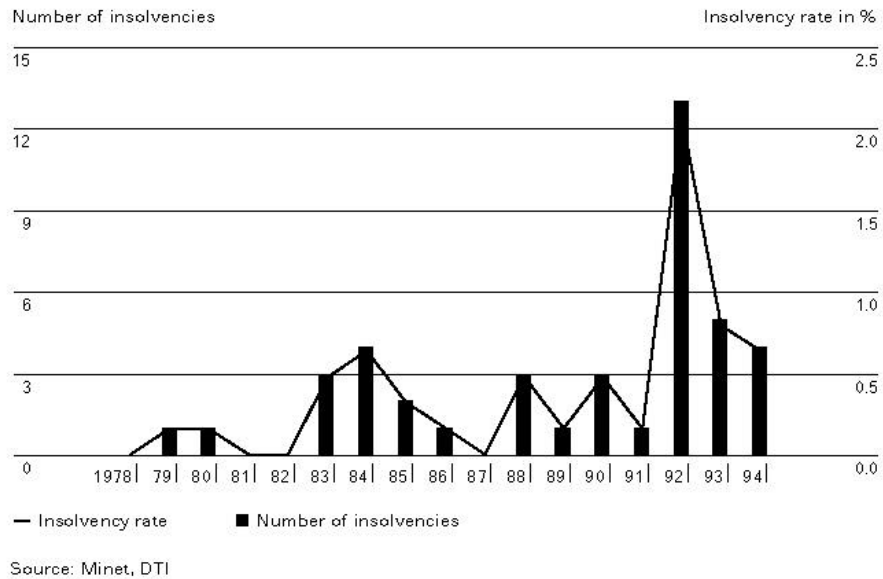
Appendix H: Swiss Re analyses of insurance insolvencies

Annual insurance company insolvency rate

USA

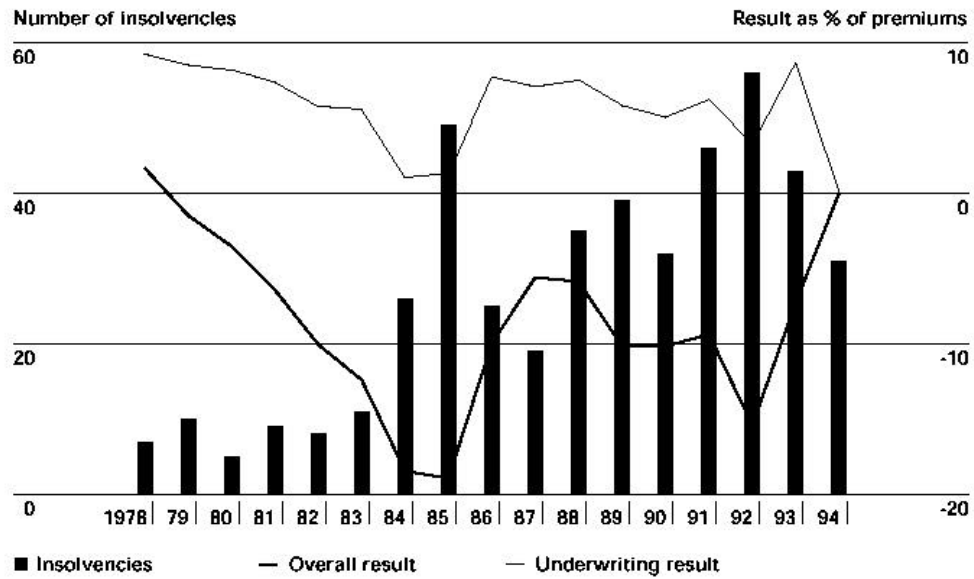


UK

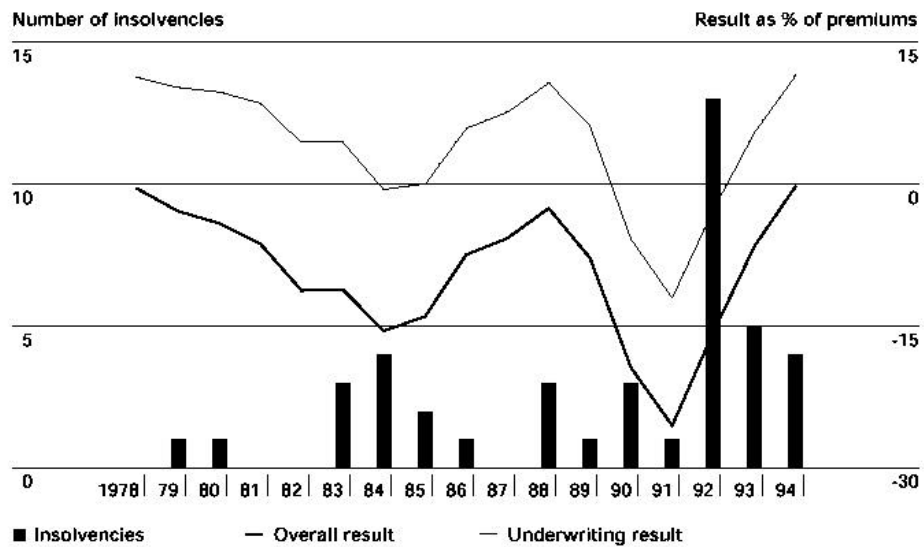


Relationship between profitability and insolvencies

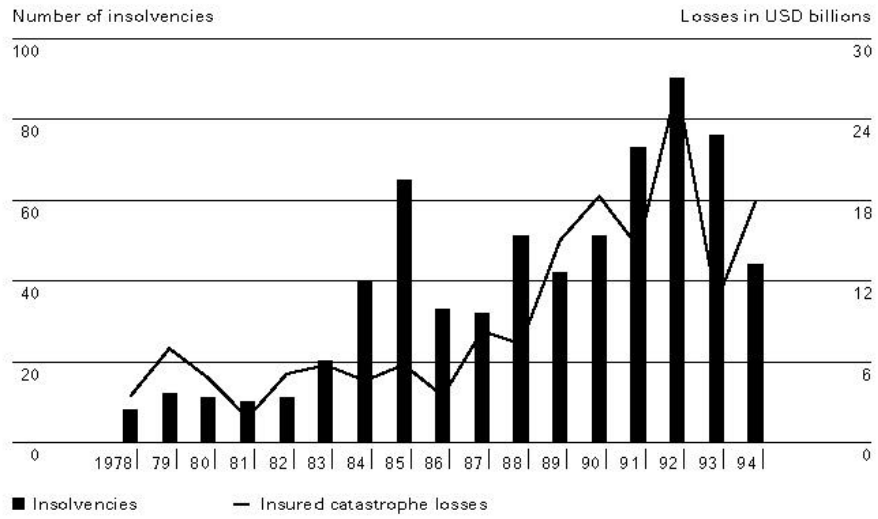
USA



UK

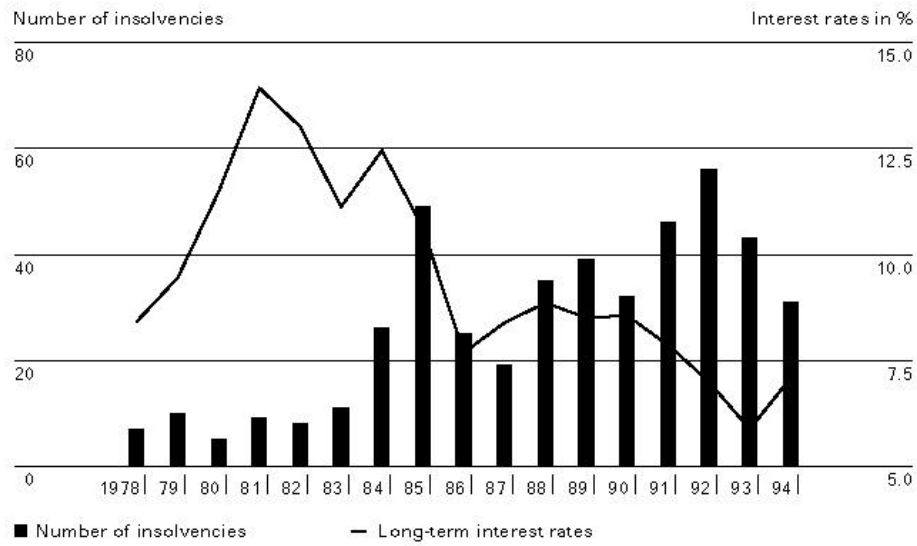


Relationship of insured catastrophe losses worldwide to number of insolvencies

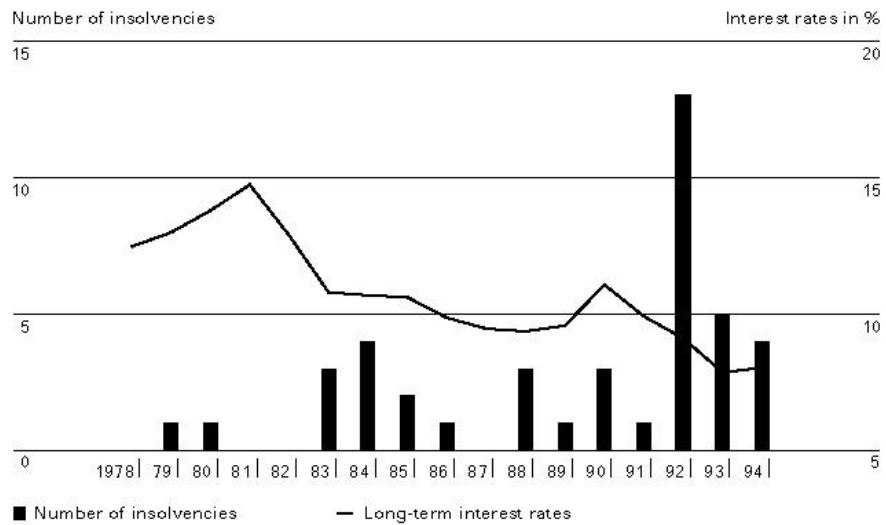


Relationship of number of insolvencies to interest rates

USA



UK



Appendix H cross-refers to paragraph 7.2 in the paper. Information taken from "Swiss Re, Sigma No 7/1995".

Appendix I: Examples of paid recovery percentages

Company	Paid recovery percentage declared	Date of most recent payment
Bermuda Fire & Marine	1.5%	July 1997
Bryanston	20.0%	1997
Chancellor Insurance	5.0%	December 1997
Dublin Re	15.0%	January 1998
English & American	5.0%	June 1997
Kingscroft	20.0%	May 1998
Walbrook	13.0%	May 1998
El Paso	20.0%	May 1998
ICS Re Private Ltd	50.0%	October 1996
Lime Street	21.0%	May 1998
Mentor	70.0%	January 1998
Mutual Reinsurance	13.0%	May 1998
Orion	15.0%	October 1997
RMCA	50.0%	August 1996
Scan Re	12.5%	
Trinity	35.0%	1997
United Re	40.0%	January 1997

Appendix I cross-refers to paragraph 8.2 in the paper.

REINSURANCE BAD DEBT PROVISIONS

SUPPLEMENTARY ADVISORY NOTE

OCTOBER 2005

Introduction

- 1 An Advisory Note was issued by the General Insurance Board in the autumn of 1999 entitled “Reinsurance Bad Debt Provisions for Lloyd’s Syndicates”. The Advisory Note described possible methodologies which could be applied by actuaries who are providing statements of actuarial opinion in respect of Lloyd’s syndicates.
- 2 At that time, there was no standard approach to the assessment of reinsurance bad debt provisions. Against that background, a working party was established with the following terms of reference:
 - To prepare a paper on reinsurance bad debts which included:
 - The principal actuarial issues which need to be considered when setting reinsurance bad debt provisions
 - Possible methodologies which could be applied by actuaries.
- 3 The original Advisory Note was **not** intended to prescribe methodologies and factors which actuaries **must** follow. It was felt that this would stifle professional judgement. However, the profession wanted to encourage a broadly consistent approach among actuaries in the area of reinsurance bad debt provisions. It was considered that such a consistent approach would be beneficial to the standing of the actuarial profession within the general insurance market.

Does the Advisory Note need to be updated?

- 4 The original Advisory Note is now six years old and it is appropriate to consider if there are any aspects of the paper which need to be updated.
- 5 Following consideration of the Advisory Note, the General Insurance Board has concluded that:
 - The principles and overall approach outlined in the original Advisory Note remain generally applicable, and there is no need for it to be re-written
 - However, there are a number of specific tables in the original Advisory Note which should be updated.

This supplementary advisory note

- 6 It has been decided therefore to issue this Supplementary Advisory Note which contains updates to three tables from the original Advisory Note. These updated tables are provided with the intention that they should not be used mechanistically, but in a manner consistent with paragraph 3 above.
- 7 The updated tables in the Appendices to this supplementary guidance note are:
 - Default rates and times to default produced by Standard and Poor’s (See Appendix F of the Advisory Note)
 - Default probabilities - Moody’s (See Appendix G of the Advisory Note)
 - Examples of paid recovery percentages (See Appendix I of the Advisory Note)

These tables are included in this Supplementary Advisory Note with the permission of Standard & Poor’s, Moody’s and PricewaterhouseCoopers respectively.

Appendix 1

Default rates and times to default produced by Standard & Poor's

Time to Default by Rating Category

Original rating	Defaults	Average Years from Original Rating	Last Rating prior to D	Defaults	Average Years from Prior Rating
AAA	3	8.0	AAA	0	N.A.
AA	18	12.0	AA	0	N.A.
A	54	11.8	A	0	N.A.
BBB	127	7.9	BBB	8	0.6
BB	383	5.8	BB	28	1.6
B	766	4.3	B	289	1.2
CCC/C	64	2.8	CCC/C	817	0.4
N.R.	N.A.	N.A.	N.R.	273	3.7
Total	1,415	5.4	Total	1,415	1.2

N.A. - Not applicable

N.R. - Removed Cumulative Average Default Rates 1981 to 2004 (%)

Rating	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15
AAA	0.00	0.00	0.04	0.07	0.12	0.21	0.31	0.48	0.54	0.62	0.62	0.62	0.62	0.62	0.62
AA	0.01	0.03	0.08	0.16	0.26	0.40	0.56	0.71	0.83	0.97	1.09	1.23	1.36	1.50	1.61
A	0.04	0.13	0.26	0.43	0.66	0.90	1.16	1.41	1.71	2.01	2.24	2.44	2.64	2.81	3.08
BBB	0.29	0.86	1.48	2.37	3.25	4.15	4.88	5.60	6.21	6.95	7.69	8.32	9.01	9.81	10.67
BB	1.28	3.96	7.32	10.51	13.36	16.32	18.84	21.11	23.22	24.84	26.50	27.84	29.08	29.93	30.94
B	6.24	14.33	21.57	27.47	31.87	35.47	38.71	41.69	43.92	46.27	48.19	49.87	51.41	53.24	54.73
CCC/C	32.35	42.35	48.66	53.65	59.49	62.19	63.37	64.10	67.78	70.80	70.80	70.80	70.80	72.26	72.26
Investment Grade	0.11	0.32	0.57	0.90	1.25	1.62	1.95	2.27	2.57	2.89	3.18	3.43	3.68	3.95	4.27
Speculative Grade	5.32	10.88	16.15	20.61	24.24	27.43	30.18	32.65	34.82	36.77	38.44	39.84	41.13	42.43	43.58
All Rated	1.70	3.44	5.03	6.40	7.50	8.45	9.24	9.94	10.55	11.12	11.61	12.01	12.40	12.79	13.20

Source: Standard & Poor's Global Fixed Income Research

Appendix 2- Default probabilities - Moody's

Average Issuer-Weighted Cumulative Default Rates by Whole Letter Rating, 1920-2004																				
Cohort	Time Horizon (Years)																			
Rating	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Aaa	0.00	0.00	0.02	0.09	0.19	0.30	0.41	0.59	0.77	1.01	1.22	1.37	1.57	1.66	1.70	1.80	1.90	1.95	2.07	2.13
Aa	0.06	0.19	0.32	0.49	0.78	1.11	1.48	1.85	2.20	2.57	3.01	3.50	3.98	4.48	4.87	5.13	5.35	5.57	5.87	6.09
A	0.08	0.25	0.54	0.87	1.22	1.58	1.98	2.34	2.76	3.22	3.71	4.21	4.65	5.09	5.56	6.02	6.30	6.60	6.89	7.19
Baa	0.31	0.93	1.69	2.55	3.40	4.28	5.12	5.95	6.83	7.63	8.42	9.22	10.00	10.70	11.32	11.91	12.51	13.04	13.49	13.95
Ba	1.39	3.36	5.48	7.71	9.93	12.01	13.84	15.65	17.25	19.00	20.60	22.16	23.72	25.10	26.31	27.44	28.59	29.70	30.58	31.48
B	4.56	9.97	15.24	19.85	23.80	27.13	30.16	32.62	34.74	36.51	38.24	39.80	41.23	42.67	43.92	45.21	46.15	46.89	47.52	47.79
Caa-C	15.07	24.77	31.82	36.76	40.50	43.63	45.85	47.94	49.89	51.64	53.63	55.61	57.33	59.19	60.94	62.52	63.90	65.34	66.69	67.95
Investment Grade	0.15	0.47	0.88	1.34	1.84	2.35	2.88	3.39	3.93	4.47	5.04	5.61	6.15	6.67	7.14	7.57	7.93	8.27	8.60	8.93
Speculative Grade	3.83	7.78	11.49	14.80	17.73	20.29	22.52	24.53	26.29	28.02	29.67	31.24	32.77	34.19	35.44	36.65	37.76	38.81	39.67	40.45
All Rated	1.48	3.07	4.59	5.99	7.24	8.37	9.38	10.30	11.16	12.01	12.84	13.65	14.43	15.15	15.80	16.41	16.93	17.43	17.88	18.30

Source: Moody's

Appendix 3

Examples of paid recovery percentages (London Market)

Run-off Scheme of Arrangement	Current Dividend
BAI (Run-off)	5%
Chester Street	5%
Drake	52%
English & American	30%
ICS (UK)	100%
Monument	36.9% (final)
OIC Run-off (formerly Orion), London & Overseas	45%
Paramount	40%
Sovereign	40%
Valuation Scheme of Arrangement	
Andrew Weir (converted from run-off)	49.65% (final)
Anglo American (converted from run-off)	90%
Aneco	72.6%
Bermuda Fire & Marine (converted from run-off)	40%
Black Sea & Baltic	30%
BNIB	100% (final)
Bristol Re	49%
Bryanston (converted from run-off)	39%
Chancellor (converted from run-off)	41%
Charter Re	90.58%
Compagnie Europeenne de Reassurances	Undeclared
Fremont (UK)	38.3% (final)
Hawk	23% (final)
ICS Re	88.8% (final)
KWELM (converted from run-off)	K-65%, W-65%, E-72%, L-68%, M-53%
Marina Mutual Insurance Association Limited	Undeclared
Municipal General	60%
North Atlantic	Undeclared
Pan Atlantic	Undeclared
Pine Top	24.9% (final)
RMCA Re	93% (final)
Scan Re (converted from run-off)	80.5% (final)
Stockholm Re (Bermuda)	36.376% (final)
Taisei Fire & Marine Insurance Company	62%
Trinity (converted from run-off)	67.5%
United Standard	27%
Liquidation	
National Employers Mutual General ("NEMGIA")	37.58% (final)

Source: PricewaterhouseCoopers.

Note: Some of the above percentages are expected to increase further over time.