LOSS PORTFOLIO TRANSFERS

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1 Introduction

There was an insurer, a broker and a consultant…….and a reinsurer, another consultant, a regulator and an accountant. The consultants had between them advised companies ceding portfolios and companies accepting them, so between the seven they covered just about every angle on portfolio transfers.

And yet each of them lacked the complete picture. The broker thought of portfolio transfers as just adverse development covers, and was surprised to learn of the regulator's considerations when approving a formal legal transfer. The regulator thought of portfolio transfers as having to satisfy policyholder protection, and was fascinated by the consultant's techniques and shortcuts in pricing a deal. The consultant looked for actuarial techniques to provide a premium, and was intrigued at the negotiations and adjustments to achieve a mutually-acceptable contract. And so on around the circle.

So we put together this paper, to cast a light on the areas that you, too, do not normally see. It discusses the most common types of loss portfolio transfer ("LPT") and the motives behind the structure selected. It examines pricing considerations and methods. It looks at the impact on policyholders, regulatory authorities, auditors, tax authorities and shareholders.

We have taken LPT as a general term for a wide variety of transactions in which a "ceding company" transfers a portfolio of claims liabilities to an "accepting company", in return for a premium. We have included full legal transfers of the liabilities and transactions that just transfer the net liability.

We have not sought to be definitive as to what design is most appropriate or how to calculate what is essentially a market premium, but have discussed factors that both sides should consider when attempting to place a value on the liabilities to be transferred. We have also mentioned some techniques that are used in practice, and have included examples of the graphs and grids that can be so powerful in illustrating to a third party the costs involved.

2 Motives for Transfer

2.1 Motives of Ceding Company

There are many motives for transferring out business. The particular motives for each party can be either micro (exiting a particularly uncertain policy) or macro (strategic entry to / exit from a territory) and will depend on the management of the company and their overall strategy. Here we describe broad categories of the more common motives.

Risk reduction – in an adverse development cover (a particular type of LPT written as an aggregate excess of loss reinsurance contract), the cedant benefits from the removal or reduction of the risk that the liabilities may be greater than the estimate at the date of the transaction. Commutation also achieves this, though in addition the cedant will not benefit if the liabilities are less than estimated. In both cases the risk of reserve deterioration is transferred away from the cedant. Note that this risk usually involves the timing of claims payments as well as their amounts.

Improving solvency – most insurers currently present undiscounted reserves in their accounts, on the grounds that future investment income will then be available as a prudent margin against the uncertainty in their claims liabilities. For long-tail classes this creates a substantial balance sheet strain which they can relieve, either by ceding the nominal liability, as with financial reinsurance, or by genuine transfer of the claims for a premium which gives credit for the future investment income (less a risk margin to cover the cost of uncertainty).

Freeing resources – keeping old books of business can distract management from current business, and may cause brokers, potential customers and rating agencies to undervalue the company. Removing a company's old liabilities from the books at gross

level, e.g. via a commutation, achieves more than just reducing the net risk. It can improve the company's image, enhance its sale value and increase its ability to issue debt. It can also free up valuable resources.

Administrative savings – there are several ways in which transfers can reduce administrative costs, particularly because old claims may involve disproportionately high handling costs. The cedant can expect savings by transferring such a book to a specialist run-off company with the systems and expertise to handle the run-off more efficiently. Alternatively a reinsurer may seek a commutation to avoid the administration costs of paying future claims recoveries periodically to the insurer.

Simplifying structure – transfers are often used to close the books on discontinued or expired lines of insurance or underwriting years, or to exit particular territories or lines of business. They are an effective way of transferring subsidiaries as a going concern and hence allowing the value of renewal business to be included in the transfer premium. They can also be used to simplify more complicated business arrangements.

2.2 Motives of Accepting Company

Eventual profit – although the ceding company may show an initial balance sheet profit, the accepting company will look to make a profit after investment returns, based on projections of future cash flow. This is particularly important for an adverse development cover where claims will only be payable after the aggregate deductible is exhausted. The aggregate deductible may be set at the level of the current reserves. This can be several years away, meaning that even a small difference between the investment returns achievable by the accepting company and that assumed by the cedant can lead to a significant profit.

Specialisation – a number of companies have appeared in recent years which specialise in accepting run-off portfolios. Portfolios transferred to run-off companies can be volatile and therefore difficult to price accurately. Consequently there may be sizeable profits to be made if these specialist companies can assemble the expertise to assess the risks and hence price the portfolio reliably.

Claims-handling expertise – specialising extends to the claims-handling process, where a run-off company can assemble staff with the expertise in managing these portfolios, especially those with latent claims. The efficiency it can achieve may be beyond the reach of the ongoing company whose claims department's familiarity lies with more recent claim types.

Negotiating advantage – the accepting company may already have accumulated a number of similar portfolios. Together these can give it a bargaining power, e.g. for class actions, and set-off rights with brokers and reinsurers which the ceding company would not have had on its own. Another aspect is that the accepting company may be free to drive a better bargain with claimants if it is not involved in writing current business.

Liquidity – of the LPT types listed previously, commutation is the only one often initiated by the accepting rather than the ceding company, e.g. an insurer may seek an immediate payment from his reinsurer in place of future recoveries. The motivation may be because it provides the insurer with immediate cash. However this would only be of value where an otherwise sound company is in cashflow difficulties. In other circumstances the cash would not help, since the amount received would normally be less than the expected claims, weakening solvency. A more common reason arises where there are doubts about the reinsurer's ability or desire to pay claims in future.

2.3 Motives for Intra-Group Transfers

Motives tend to be quite different when the two companies are part of the same group. Making a profit from a favourable premium is no longer a factor, at least when viewed from a group perspective. Likewise, strengthening a balance sheet via a discounting effect is uncommon as such transfers are usually designed to be revenue neutral. Instead other considerations arise.

Where the ceding and accepting companies belong to the same parent group, the directors need to be aware of possible conflicts of interest. Often the directors of a group parent are also directors of subsidiary companies, and their prime duties lie towards their individual companies and the policyholders of those companies. It follows that they should not support transfers that weaken the position of policyholders in any one company without suitable measures to mitigate this effect. Independent directors have an important role in ensuring their companies are treated fairly in any negotiations within the group.

Ring-fencing old liabilities – a company with substantial latent liabilities such as asbestos and pollution may become unattractive to brokers looking to place new business. If the premium for transferring these old liabilities to a third party is too high, a group may be tempted to separate them from current business by transferring either the former or the latter to a dormant insurance company within the group. Such ring-fencing may be accompanied by a name change to identify the ongoing business with the group, or to distance the latent liabilities, and the reserves may need capital or reinsurance support to make the transfer acceptable to the regulator.

Tidying the group – transfers may be used to clean up a group, e.g. to make the practical working of the group reflect the legal structure, to remove excess legal entities, to move solvency and liquidity to where it is needed, etc. Where solvency is an issue, the premium payable by the ceding party may not reflect the value of liabilities transferred and may even be a nominal figure such as £1. Directors would have to be confident that any such non-arms-length transactions do not put groups of policyholders at risk, and are also correctly treated from both tax and legal perspectives.

Profit-taking / taxation – transfers may play a part in optimising a group's taxation position, at the expense of attracting the interest of the tax authority. Also they may enable distributable profits to become available in parts of the group that can afford to pay them. For example, where a UK insurer may wish to cede liabilities to a group reinsurer in Bermuda, this presents an opportunity for tax optimisation as investment income accrued on the premium received by the reinsurer will not be taxed. There are a number of issues that will need to be considered such as the need to satisfy UK transfer pricing legislation, which requires intra group contracts to be conducted at "arms length".

3 Means of Transfer

There are many means by which a cedant may transfer the net liabilities for a group of insurance policies to an accepting company. These can be divided into two broad groups according to whether the transfer is of (i) just the net liability or (ii) the full gross liability, i.e. whether the ultimate legal liability to pay the claims remains with the cedant or passes to the accepting company.

3.1 Legal Liability Unchanged

These are normally private arrangements between the two companies and do not necessarily involve the policyholders. In many instances, the policyholders may even be unaware that their insurer has passed on the net liability, but even when such transfer is visible, the policyholders still have legal resource against the cedant in the event of failure to pay by the accepting company.

Regulatory permission is not normally required. However, a regulator may become involved to protect policyholders if the transfer jeopardises the cedant's ability to meet claims, e.g. by reinsuring with a weak reinsurer; or if the cedant may become too remote to be pursued legally, e.g. original Lloyd's Names after successive reinsurance to close arrangements.

Reinsurance to close (RITC) – the ceding insurer is a cohort of Names and the accepting insurer is (usually) another cohort of Names. The ceding and accepting Names may be the same but they belong to separate economic identities corresponding to the year in which they provided capital. The RITC process has been defined and discussed in an Institute paper by David Hindley dated 27 March 2000.

Reinsurance – all reinsurance involves transfer of liabilities, but usually reinsurance is purchased before the underlying risks come into force and often before the policies are even written. Here we are concerned with aggregate excess of loss covers where the underlying policies are already partly or fully expired. Thus the cover is for deterioration of the claims portfolio, perhaps with an unearned element. Such transfers are generally referred to as Adverse Development Covers (ADCs). They are usually net of any pre-existing reinsurance arrangements.

Commutation – the reinsurer transfers liabilities back to the insurer for a premium. Theoretically this is no different from a transfer to a third party, but in practice it is much easier because of familiarity of both parties with the business and often the presumption of a continuing business relationship.

Finite risk reinsurance – legally this behaves as traditional reinsurance, but the practical effect and reasons for the arrangement may be very different. If there is too little real risk transfer to satisfy the local accounting requirements, this would be considered to represent a transfer of neither the gross liabilities nor the net, and would be termed financial reinsurance.

3.2 Legal Liability Transferred

These can never be private arrangements between the two insurers because there is a legal change to the policyholders' position. Policyholders need either to be informed or for there to be a procedure such that future claimants can trace the change of insurer. Such a transaction may require the agreement of the policyholders and/or court or regulatory permission according to local law.

Novation – this is a commercial negotiation between the policyholder and the two insurers involved, in which legally a new contract is formed to replace the existing one. This would allow the original insurer to release any security held for the risk. Novations of individual or small numbers of contracts may be possible without regulatory involvement where all policyholders can be contacted and where the insurance does not involve the rights of third parties (e.g. under compulsory insurance), which would need to be protected.

Transfer of part of the business – where numbers of policyholders are too large for individual novation, the companies would need to operate under local transfer of business legislation. This may also be true of multiple novations, if there is a legal requirement for approval for arrangements involving sufficient contracts to constitute a transfer of part of the business.

Transfer on renewal – strictly this is not a transfer of outstanding losses at all, but legally a new contract entered on renewal. However, renewals can be bound up with transfers of loss portfolios and can involve rights carried forward from the current contract, e.g. to no-claims discounts or pegged premium rates.

Sale of entire company – a group can effect a transfer by selling a subsidiary, this being a full or partial transfer of the group's insurance interests according to whether there are other insurers in the group. Legally the policyholder remains with the same company. We have included this in the "legal liability transferred" section because the ownership changes and this change of control will need regulatory approval in most jurisdictions. Many of the considerations for approval will be similar to those for a transfer because policyholders may be affected, e.g. by the change in parental company support. Where the accepting company is taking on the entire insurance company as well as the portfolio of policies, there will be other considerations such as employee and shareholder rights.

4 Legal & Accounting Requirements

4.1 UK Legal Requirements

Transfers of net liability which do not involve transfer of the legal liability (reinsurance, commutation, etc.) do not normally require regulatory approval. The exception to this would be when one of the firms involved has already been placed under a requirement to report such contracts, perhaps because it has only recently been authorised or because the regulator is concerned as to its financial viability.

Likewise, individual novations would not normally involve the regulator because the arrangement is already subject to the agreement of the policyholder. This may not apply to a transfer of compulsory insurance such as an employer's liability contract because there is an affected third party with legal rights, here the employees, which will not be party to the negotiation.

Multiple novations may not require regulatory involvement if the numbers of contracts are small, but such an arrangement would trigger regulatory involvement if it involved enough contracts to constitute a transfer of part of the business. Determination of whether a multiple novation fell into this category would be on a case by case basis.

So, legal considerations normally only arise in the cases of transfer of part or all of business by a company, or sale of the company itself (change of control).

4.1.1 Pre-N2 transfers

The UK legal position changed on 1st December 2001 ('N2') when the Financial Services and Markets Act (FSMA) came into force. This Act moved the formal responsibility for

UK insurance regulation from the Treasury to the Financial Services Authority (FSA) which until then had been operating under licence from the Treasury.

Prior to N2, transfers of business had taken place under Schedule 2C of the Insurance Companies Act 1982, supported by regulations and modified by subsequent legislation. This regime still applies to any transfers which began before N2, but we trust there will be few such, if any, remaining by this time. However, as the old regime will still be the more familiar to anyone who has not yet been involved in a transfer under FSMA, the main changes are indicated below.

4.1.2 Post N2 transfers

The principal changes under FSMA Part VII compared with Schedule 2C are as follows:

- It is now for the court, rather than the regulator, to decide whether to approve the transfer scheme (as was previously the case only for long-term business transfers).
- If the parties want a waiver from the requirement to notify all policyholders, this is also now decided by the courts rather than FSA, but in practice the FSA can influence the decision.
- The parties are required to present to the court an independent report on the terms of the scheme of transfer. The FSA nominates or approves the person making the report, and prescribes the form of the report itself. Previously no such independent report was required for general insurance business transfers, though the FSA might have required an actuarial report into the extent and uncertainty of the liabilities.
- A greater range of rights and liabilities may be transferred under FSMA than was the case under Schedule 2C. In particular the court may approve the co-transfer of the

reinsurance contracts protecting the transferred business. The court may also transfer any relevant continuing legal actions from the ceding to the accepting company.

- The FSA and any person who considers him/herself to be adversely affected (including an employee of either insurer and any reinsurer involved) can make representations to the court. In practice the scheme (and any requests for waivers from notifying policyholders) would often be modified to meet any concerns of the FSA. Under the Schedule 2C regime the court placed considerable weight on the opinion of the FSA when considering a proposed transfer.

Instead of being supported by regulations issued by Parliament, as was previously the case for the Insurance Companies Act, FSMA is given flesh by the FSA's rulebooks and guidance. The guidance given with regard to schemes of transfer includes the following:

- Firms should normally send policyholders a statement of the terms of the scheme of transfer and a summary of the scheme report.
- Firms should co-operate fully with the independent expert who is making the report.
- The expert should consider the likely effect on policyholders, distinguishing between (i) transferring policyholders, (ii) policyholders remaining with the transferor, and (iii) policyholders of the transferee. Separate consideration may be necessary for sub-groups of these if the transfer will affect them differently. However, the report can be very short if it is clear that no-one will be adversely affected.
- Firms should give policyholders at least six weeks to consider a scheme of transfer.
- Even though the court can now transfer reinsurance of the transferred policies, firms should negotiate with reinsurers in advance, to the extent practicable, to reduce the risk of subsequent dispute.

- If the transfer involves a Lloyd's syndicate, the FSA must consider the effect of the scheme of transfer on the Society of Lloyd's.

A group under Fred Duncan has been drafting a Guidance Note, which should be exposed shortly, to help actuaries preparing reports on schemes of transfer under the new FSMA regulations.

4.1.3 Changes of control (sale of entire company)

Since the policyholder remains with the same company this is not covered by the transfer of business legislation, but by change of control (FSMA Part XII). However, policyholders may be affected, e.g. by the change in parental support, so for the FSA many of the considerations for approval will be similar to those for a transfer.

The legal procedure is different from that for a transfer. A change of control is dealt with by the FSA without court involvement. The FSA must satisfy itself that the acquirer is fit and proper, and that the interests of consumers are not threatened by the acquirer's gaining of control. The FSA needs to be convinced that the insurer will satisfy the threshold conditions required of any UK insurer, especially that it has adequate resources. This refers not just to the financial reserves and capital to meet existing claims, but also to the staff capability to service the existing and any planned future business effectively and needs to be considered having regard to the effect of the insurer's membership of a group.

4.2 UK Accounting Effects

The company transferring a part of its claims portfolio reduces its net reserves by the appropriate proportion of its reserves. Its assets decrease by the premium paid, and any

profit or loss on transfer appears in the revenue account. It will register any premium paid in the cashflow statement, either as a reinsurance premium or a payment of claims (for a transfer or commutation).

For any form of transfer where the legal liability to the underlying policyholder passes from the transferring company (and for a reinsurance commutation where it never had this in the first place), the company removes the gross liability from its books. For a transfer via traditional or finite reinsurance, however, the insurer's gross liability remains and is balanced by reinsurance recoveries on the asset side, less any deduction for possible non-recoveries.

In the case of finite reinsurance, the company will need to account for any experience account or liability for further premiums or commission payments. If the reinsurance does not involve sufficient risk transfer, it may not be accounted as reinsurance. In the UK, reinsurance which involves only timing risk can be deemed to involve sufficient risk transfer and therefore can be accounted as genuine reinsurance.

For the accepting company, the liabilities received may be reserved at a different level to that agreed when negotiating the transfer premium. This may be because the company discounts its reserves at a more prudent rate than that determining the transfer premium, or does not discount them at all. To reduce the resulting balance sheet strain, the risk margin allowed for in the transfer may be omitted in determining the level of reserves. There could also be a difference in valuations if the actual loss portfolio when reviewed at the year-end turned out to be not quite what the accepting company had assessed at the time of the transaction. When (or if) fair value accounting is introduced, the balance sheet strain or benefit for the transferring company is likely to be relatively slight.

Reporting of the transfer in the FSA returns follows the same general principles. At the more detailed sub-accounting class level, companies are required to report business accepted via a legal transfer separately from existing business. This applies throughout the run-off of the portfolio and avoids at least some of the disruption from an inward transfer, for example by not upsetting any gross payment patterns derived for the existing business. In certain cases where an intra-group transfer simply crystallises an existing arrangement (e.g. a 100% quota share), the FSA may give permission for the business to be reported as if the accepting company had written it throughout, resulting in more consistent data.

It is not the purpose of this paper to go into further details of accounting treatments.

4.3 US Legal Requirements

The legal requirements are set at State level, so there are potentially 50 different sets of rules. It is beyond the scope of this paper to investigate these.

4.4 US Accounting Requirements

In determining the impact of an LPT, there are several accounting rules that should be considered. The most significant is FASB 113, "Accounting and Reporting for Reinsurance of Short-Duration and Long-Duration Contracts", issued in December 1992 by the US Financial Accounting Standards Board. FASB 113 applies only to public reporting in conformity with US GAAP and it:

- establishes the conditions required for reinsurance contracts to satisfy the "transfer of risk" criteria.

- precludes the immediate recognition of gains from ceded reinsurance contracts, unless the ceding company's obligations to its policyholders are extinguished. Thus it eliminated the practice of insurance companies reporting their liabilities net of reinsurance ceded. Reinsurance receivables and recoverables and ceded unearned premiums are to be reported as assets with reserve liabilities reported gross of reinsurance credits.
- makes a distinction between short-duration and long-duration reinsurance contracts, and furthermore for short-duration contracts between prospective and retroactive contracts.

4.4.1 Long-duration v Short-duration, Prospective v Retroactive

Long-duration contracts are those that are generally not subject to unilateral changes in provisions, e.g. non-cancellable contracts such as most life insurance policies.

Short-duration contracts are those that provide protection for a fixed period of short duration and enable the insurer to cancel the contract or adjust the terms at the end of any contract period. Examples are most property and liability insurance policies.

Retroactive contracts are those covering risks which have already occurred, even though the claims may not have been reported, namely loss portfolio transfers. Prospective contracts are the opposite, i.e. those covering future or unearned risks.

4.4.2 Reinsurance of short-duration contracts

FASB 113 requires that in order for a contract to be recognised as a reinsurance contract in the accounts under US GAAP, it must transfer a "significant" amount of both

underwriting and timing risk. The reinsurer must have a "significant" risk of loss with regards to both the probability and amount of loss. The following two conditions must generally be met:

- **Transfer of Risk Test or the "9a Test" – t**he business ceded under a reinsurance contract should be subject to some degree of variability with respect to both the amount and timing of underwriting results. Furthermore, the reinsurer's financial results should vary, to some extent, with the ceding company's gross results, although this relationship does not have to be proportional.

- **Significant Loss Test or the "9b Test" –** the significance of loss is determined by comparing, under one or more reasonably possible outcomes, the present value of all the expected cash flows (i.e. claim recoveries, premiums, ceding commissions, cancellation penalties, etc.) between the reinsurer and the ceding company to the present value of the amount paid or deemed to be paid to the reinsurer. If more than one reasonably possible outcome is evaluated, the same interest rate is to be used to compute the present value of the cash flows for each reasonably possible outcome.

Contracts that do not meet these risk transfer test conditions do not qualify for reinsurance accounting and as such are to be accounted for as deposits.

4.4.3 Reinsurance of retroactive contracts

For retroactive contracts, the underwriting profit resulting from the difference between ceded loss reserves and the reinsurance premium must now be distributed over the entire period of the contract. Hidden reserves cannot be released in the current business year, even if the reinsurer assumes substantial insurance risk.

4.4.4 Impact of FASB 113

FASB 113 affected the balance sheet of most insurance companies. The requirement to report reinsurance recoverables as assets represented a significant change for most insurance companies. The requirement for genuine risk transfer before a contract could be accounted as reinsurance meant that pure financial arrangements lost much of their attraction and became supplanted by finite risk arrangements.

Finally, insurers' income statements were particularly affected for those ceding companies using reinsurance arrangements that were retroactive in nature. In this respect FASB 113 reduces the structural advantages offered by loss portfolio transfers with regard to public financial reporting.

5 Pricing the Transfer

The pricing of the LPT is dependent on the structure of the transaction and the type of reserves involved. The ceding and accepting insurers will each need to assess the portfolio being offered for transfer, though the accepting insurer will be restricted to the data supplied by the cedant, unless already involved with the business (e.g. in the case of a commutation). Each will need to consider :

- best estimate of future claims,
- degree of uncertainty, i.e. likely variability from best estimate,
- estimated payment pattern,
- value of future investment income, i.e. effect of discounting,
- expenses of handling run-off, both allocated and unallocated loss expenses,
- accepting company's profit margin and cost of capital,
- future profits/losses from any unexpired business,
- value of any resources transferred, e.g. claims staff, renewal rights.

Even where it is not necessary to pay a premium reflecting the value of the liabilities, the insurers may still want to calculate the theoretically correct premium in order to understand the portfolio assumed or for financial management purposes.

5.1 Best Estimate

Data is likely to be supplied in the traditional paid and incurred triangles, gross and net, of classes or sub-classes sufficiently divided to be broadly homogeneous. Unusual or large claims and accumulations may be identified separately, especially for gross data. Analysis will probably begin with the traditional actuarial projections, and allowance is needed for any unexpired risks. Latent claim analyses will be carried out based on the

type and detail of the information available. The techniques for determining best estimate are essentially those for pricing or reserving, except perhaps for differing degrees of prudence, and we do not discuss them further here.

5.2 Class Level Variability

The uncertainty associated with the liabilities will be important in pricing the premium, especially for reinsurance contracts with deductibles well above best estimate. For this reason it is necessary to consider the distribution of possible liabilities.

One approach is to vary the assumptions relating to the key uncertainties, such as initial expected loss ratios and the tail factors, to generate a number of scenarios. Using judgement the actuary selects those representing, say, low, best and high estimates and assign these percentiles such as 10%, 55% (because of skewness) and 90%.

The next step is to select a distribution for the claims outcomes, generally a right-skewed distributions such as the log-normal or gamma. The parameters of the distribution can then be fitted from the selected points.

The dangers of this approach are many. Determining the percentile to apply to a scenario is highly judgemental, and extrapolating from a distribution fitted to points such as 90% to determine more extreme values is heavily dependent on the chosen curve being suitable. Perhaps the greatest danger lies in the spurious impression of accuracy such an apparently scientific approach may present to the client (or to the actuary!).

The above approach begins with percentiles and uses them to derive a distribution. A second approach is to reverse this process and derive the distribution first. Commercial

software can be used to derive the parameters of the distribution from the claims data. Stochastic methods can then be applied to derive percentile costs. Stochastic claims reserving techniques such as bootstrapping have been discussed in an Institute paper by Peter England and Richard Verrall dated 28 January 2002, and in many other places.

5.3 Credit for Independence

From our derived distributions, it is possible to simulate to produce a range of reserves for each class of business. When combining classes of business it is important to understand how much credit can be given for diversification. Where classes of business behave independently, full diversification can be allowed for. However, where there is likely to be some correlation, for example between a cargo account and a hull account, only limited or no diversification may be taken into account.

A full scientific approach would involve the deriving of correlations for each pair of classes and establishing a correlation matrix. This is difficult and time-consuming, and raises the question as to whether it is better to measure linear correlation or rank correlation (the latter perhaps making better sense since the underlying distributions are non-linear). In practice simpler approaches are generally used, such as :

- Calculate variability based on full correlation (via addition) and full independence (via root sum of squares for standard deviations). Interpolate between these, e.g. take credit for 25% or 40% independence, depending on the diversity of the portfolio.
- Group classes which are influenced by similar factors. Assume full correlation between classes within groups, and full independence between groups of classes.

- Calculate an overall distribution then superimpose a shock, e.g. via two distributions, with and without shock, with appropriate probabilities. Can also be used for catastrophe-exposed classes in the case of unexpired risks.

The following table shows two classes of business, both assigned lognormal distributions. The total columns show the distribution of costs if the classes are assumed to develop in tandem or entirely independently (based on 10,000 simulations). For percentiles above that corresponding to the mean, the assumption of independence implies an allowance for diversification, reducing the volatility of the total portfolio. In practice an accepting insurer might want to assume partial correlation even between seemingly independent classes, since both would depend to some extent on future economic conditions.

	Class A	Class B	Total if fully correlated	Total if fully independent	Diversific-ation effect
Mean	24,960	3,041	28,001	28,001	
Std Devn	13,308	614	13,922	13,327	
10%	11,604	2,307	13,911	14,602	691
25%	15,719	2,605	18,324	18,739	415
50%	22,025	2,981	25,006	25,060	54
75%	30,858	3,411	34,269	33,964	(306)
90%	41,799	3,852	54,260	44,875	(776)

5.4 Discount Factor

Two aspects of this part of the pricing are important to both parties: the reinvestment risk and the timing risk. To minimize the reinvestment risk, the accepting insurer will attempt to match bond maturities with the expected payment pattern in order to immunize itself against interest rate changes during the holding period. The timing risk refers to the

possibility that losses are paid earlier than anticipated in the payment pattern assumed for the pricing.

The premium should reflect the cashflow profile incorporating both elements above when allowing for investment income. The discount rate could be the risk-free rate of return applicable to the mean term of the liabilities or an inter-bank loan rate. The reinsurer may be able to offer a higher rate than the ceding company can achieve on its own investments, perhaps because of a larger asset base or a better portfolio mix. Care is needed when the yield curve is volatile, e.g. the result discounted at 5% p.a. may be significantly less than the average of the result discounted at 4% p.a. and 6% p.a. The company should evaluate its cost of capital and determine whether the built-in rate is acceptable.

Either company may wish to explore the effect of different payment patterns. The possibilities are endless, but again a simple assumption will normally be sufficient. The two obvious alternatives are to adjust each year's payment proportionately, or to assume the early years are unchanged and any extra claims are paid by extending the pattern. The latter is relevant because there is often a negative correlation between reserves and payment pattern. So extending the pattern reduces the impact of extra claims since the discounted figure increases by a smaller proportion.

5.5 Best Estimate v Uncertainty v Discount Factor

The three main features above of the claims liability element of the pricing are:

- best estimate;
- uncertainty (combining class-level variability with credit for independence); and
- discount factor.

Which of these is the most significant will depend on the nature of the contract. For example, we can consider three adverse development covers with very different terms, say for a portfolio with cedant's current best estimate of $100m:

i) a working cover such as $100m excess of $100m. The risk premium will be high because there will be roughly a 50% chance that cover will be invoked, and the premium will depend heavily on the two insurers' assessments of the best estimate. If the accepting insurer assesses the best estimate at $110m, this $10m difference between the two best estimates will lead to a big gap between the premium required and that offered.

   The cedant may be able to reconcile such a difference by offering more detailed claims data, perhaps a sub-division of the classes offered, perhaps a split by head of damage, or perhaps details of large or latent claims. If this fails, a cutback in cover or a move to a finite risk contract may be necessary.

ii) a high-level protection such as $100m excess of $150m. The risk premium will be relatively low because the cover is less likely to be used. Best estimate still affects the premium, but is no longer the main driver – the premium will depend more heavily on the two insurers' assessments of the uncertainty. Thus, if the accepting insurer assesses the best estimate at $110m, this will cause much less of a difference than if, through fears of hidden dangers, he assesses the uncertainty as double the cedant's assessment.

   To reconcile such a difference, the cedant may need to help the accepting insurer understand better the motives for the transfer, and to provide exposure information which can reassure him as to the extent of any hidden dangers.

iii) a finite risk cover where payment is likely but will not begin for some years, such as $30m excess of $70m payable only when the cedant's payments have exceeded the $70m. The premium will be close to the discounted value of the liabilities, and will not be greatly affected by the best estimate or the uncertainty, but will largely depend on the two insurers' assessments of when the claims will begin to be paid, and on the assumptions for investment return.

An alternative method of protecting the accepting insurer against unexpectedly early payment is to build periodic limits into the contract, such as for no recoveries in the first five years and no more than $5m each year thereafter.

It is important for the parties to identify which of these three (or what other element) is most responsible for any difference in their assessments of an appropriate premium. Graphical tools for understanding and illustrating the pricing are shown in the example at the end of this paper.

5.6 Additional Considerations

The accepting insurer will incur significant expenses depending on its size and the nature of other portfolios it already manages. It can conduct an expense analysis on both allocated and unallocated expenses, either through internal analysis or by considering appropriate adjustments to the ceding insurer's expense ratios.

Allowance also needs to be made for profit, perhaps based on the insurer's required risk-adjusted return on capital or the level of competition. Credit may be given for any special feature such as the inclusion of transfer of renewal rights.

Finally, the premium the two parties are prepared to agree will be affected by:

- accounting of transaction,
- tax implications,
- cost of capital,
- release of collateral,
- accumulations with other business.

The accepting insurer should take account of the possible motives of the ceding insurer. The latter may wish to effect a transfer in order to remove high levels of uncertainty from expired portfolios. Such uncertainty is likely to be modelled in the pricing exercise, but it may be useful to understand the insurer's needs and objectives, as this will help the accepting insurer understand all the features of the portfolio. The accepting insurer needs to be aware of the asymmetry of information about the portfolio which puts him at a negotiating disadvantage.

In the real world the data problems can be severe. We have seen a prospective transfer with many claims repudiated by the cedant for non-payment of premium and not on the system; with the data converted to US$ at historical rates of exchange which could not be adjusted to current rates (some of the currencies no longer existed, and this was before the euro!); with reinsurance documentation that could not be verified; with pool reinsurance whose effect could not be measured; with large claims subject to late unexpected development; and other undesirable features. Perhaps not surprisingly, the two parties failed to agree terms.

5.7 Other Parties

The premium may need to be acceptable to other parties as well. The regulator or court may not accept a transfer at a premium that leaves one of the parties too weak. Also, for a transfer within a group (e.g. between two captives) the tax authority may not treat as tax-deductible a premium that it considers excessive if this reduces taxable profits.

However, the tax authority does recognise the cost of uncertainty. We have seen a transfer (between two captives following a merger) for a $31m premium which was fully allowed for tax purposes even though discounted reserves were only $25m. The tax authority accepted the opinion of an independent actuary that $6m was a justifiable risk margin.

6 Design of Transfer

The transfer which an insurer wishes to make will not always be acceptable to the prospective accepting company or to the regulator. There are many ways of altering the terms to satisfy the parties involved, and we look at a few aspects here.

6.1 Improving the Transfer

6.1.1 Reserve adjustment or indemnity

Sometimes the degree of uncertainty in the reserves is the main obstacle in the premium negotiations. If this happens and the primary reason for the transfer is something other than removal of uncertainty, the cedant can make the deal more attractive by retaining part of the uncertainty risk.

In the case of reinsurance, this can be done through a limit of cover. For a full legal transfer, there is sometimes a clause inserted in the agreement to review the portfolio development after a specified period of perhaps two or three years. At that time the reserves are re-estimated in an agreed fashion, and part or all of any deterioration is funded by the cedant. Sometimes the agreement is two-way, in which case if there is reserve redundancy a proportion would be returned to the cedant.

6.1.2 Limits and deductibles

Many cedants have an idea as to the cover they would like but are naïve as to its cost. An example is the cedant who wanted complete protection against reserve deterioration and so approached his broker asking for an ADC for unlimited cover excess of the loss reserves. The cedant imagined this would be relatively cheap, so even without doing too much analysis the broking actuary was able to provide insight by warning him that :

- cover at the bottom of this layer would be very expensive – around 50% marginal rate-on-line before costs and discounting, assuming the reserves were as likely to get worse as better,
- any difference in best estimate between cedant and insurer would be priced at well over 50%, and so perhaps cost more than $1 per $1 cover, after costs (for example, if the cedant wants cover from loss reserves of $100m and the reinsurer's best estimate is $110m, the latter will believe there is more than a 50:50 chance of the first $10m being used, and so charge over 50% before costs and discounting),
- higher up the layer, claims uncertainty would be much greater than the cedant realised, making unlimited cover expensive.

To bring the cost back to acceptable levels, the cedant should consider:

- avoiding 'money swapping' by carrying the first few $m of deterioration, i.e. seeking a deductible somewhat greater than best estimate,
- seeking limited cover,
- supplying more extensive data to try to narrow the gap between best estimates.

Had the timing of payments been a more significant factor than it was in this case, the cedant might also have considered building in 'break points', i.e. limits to amounts paid by various durations. For all these options, the actuary can use presentational tools such as the graphs and grids shown in the example at the end of this paper to illustrate the impacts more vividly.

6.1.3 Experience accounts and profit commissions

Another way to reduce the up-front cost to the cedant is to use a finite risk arrangement instead of traditional reinsurance. In a finite arrangement, the effective cover is reduced from the nominal insured value, bringing the up-front cost down with it. The reduction of the actual transferred risk can be as great or small as the cedant wishes and can be achieved in various ways including experience accounts, additional deferred premiums and profit commissions.

It is of course essential that the cedant understands the implications of such a cover, including any future liabilities which must be paid (and reserved for!), and the effect of any commutation options. Also to be clarified is how the accounting of the transaction will affect balance sheet solvency and how the transfer will be treated for tax purposes.

6.1.4 Restricting the business transferred

Where differences cannot be resolved by the cedant supplying extra information, the parties may decide simply to omit those classes, territories or years on which negotiations have foundered. However, it should be noted that the areas which are the sticking points in negotiations will probably be those subject to the greatest uncertainty and hence which the cedant most wishes to pass on.

The ceding company can achieve a similar effect by using one type of transfer to restrict the business transferred by another type. For example, the company could try to commute certain liabilities (e.g. asbestos & environmental) prior to a sale, or could provide a stop loss reinsurance against future adverse deterioration prior to a Part VII transfer.

6.1.5 Unacceptable reinsurance

Problems arise if the accepting company's security level for reinsurance is higher than that of the ceding company at the time the business was written. In addition, reinsurers may have failed or been downgraded in the meantime. There may be additional problems if the liabilities are old, such as lost reinsurance documents or cover via line slips or Lloyd's syndicates which no longer exist. The accepting company will not be prepared to give full, or perhaps any, credit for recoveries in such circumstances.

The transfer premium will reflect any such weaknesses in the reinsurance, perhaps widening the gap between the premiums offered and asked. If the accepting company puts zero or low value on reinsurance recoverables which the ceding company regards as good, an agreement regarding these must be reached.

Where the transfer is accomplished via reinsurance such as an ADC, the usual approach is to include only the net of reinsurance liabilities, in effect deeming that any existing reinsurance will be fully operational. This leaves the reinsurance credit risk with the cedant and avoids the need for the accepting company to assess the value of the in-force reinsurance and adding a further risk premium.

6.1.6 Disputed or repudiated claims

The converse of the irrecoverable reinsurance is that the ceding company may be disputing or repudiating certain inward claims and hence have removed them from its claims system. It will have to warn the accepting company of these, and of any poorly-worded policies which could lead to types of claim not already listed under the coverages provided. These uncertainties will no doubt increase the premium to reflect the risk of

possible reopened claims or new claim types. As usual, an alternative is to exclude these claims or policies from the transfer.

6.1.7 Involving other parties

We have seen a case where Company W had shared an underwriting stamp with Company X and had also acquired some of X's liabilities by part-reinsuring Company Y which had fully reinsured X. Company W was in run-off and wanted to transfer all these liabilities to Company Z. Y was happy to co-operate because it wanted to commute its own liabilities for this business in due course and preferred to deal with a single insurer Z instead of both W and X. But X had zero net liabilities and regarded itself as out of the loop. In order to achieve the transfer, W had to allow its actuaries to get involved with the rest of the chain or as much of it as feasible, here Y and Z.

6.2 Satisfying the Regulator

For a transfer of the legal liabilities, the regulator will wish to satisfy itself that the company accepting the transfer is financially sound, and that the transferring policyholders are not disadvantaged. The FSA is often asked what degree of security it requires for the accepting company, and its inevitable starting-point is that it depends on the circumstances.

This may seem unhelpful, but consider the following two transfers where the assessed chances of claims being paid in full are:

Company A (99%)	→	Company B (95%)
Company C (50%)	→	Company D (90%)

B is stronger than D, yet the first transfer increases the risk to policyholders by a factor of five, while the second reduces it by the same factor. Common-sense says that the second transfer is more likely to be acceptable. Indeed the regulator could face considerable and justified criticism if it allowed the first transfer or disallowed the second.

However, this argument cannot be taken to extremes:

Company E (99.99%)	→	Company F (99.9%)
Company G (1%)	→	Company H (10%)

The transfer from E to F represents a tenfold increase in risk, but it is likely a regulator would allow it on the grounds that F is extremely strong. Indeed he would probably not have the legal power to object. Conversely, a regulator would be reluctant to allow business to be transferred into a company as weak as H, even though it would represent a tenfold improvement in policyholders' chance of being paid. Again, legal requirements may determine the issue, this time by preventing such a transfer.

The general position illustrated by these four examples is broadly reflected in UK law. FSMA and the FSA's principles generally refer to financial resources in absolute terms (e.g. satisfying the FSA's threshold conditions). But for a change of control the FSA is required to ensure that the interests of consumers are not threatened by the acquirer's gaining of control, which carries an implication that the relative pre-transfer position is relevant. It is true that for Part VII transfers, the requirements do not explicitly mention the relative strength of the two parties, and that the Court's view is as yet untested, but it is difficult to imagine that the Court will not have at least some regard to this.

In practice, of course, the chance of failure will be far less clear-cut than this, and anyway the regulator will be concerned with trying to negotiate better terms for the policyholders before it gets to the decision as to whether or not to object. This brings us to the ways in which the companies can make the transfer more acceptable to the regulator.

6.2.1 Reserve strengthening

One way to persuade the regulator not to object to a transfer is by demonstrating that there is a high probability that policyholders' claims will be paid. This is particularly relevant where a strong insurance group is selling a subsidiary to a run-off organisation, or where it is moving old liabilities into a dormant or run-off company within the group to separate it from ongoing business.

In the former case, the regulator will presume that, once the transaction is complete, no further financial support will be forthcoming from the run-off company for its new subsidiary. This therefore represents a weakening of policyholders' position from their membership of the strong group, since there must be at least some chance that the group would have provided financial support, if necessary, if only to preserve its own good name. To compensate for this, the regulator may seek a strengthening of reserves.

In the latter case, the regulator will be aware that as long as policyholders were in a company which was still writing, the group would have had to support the reserves financially, if necessary, or watch the company's ongoing business disappear. Once the old and new business is separated, however, the group could let the 'dustbin' subsidiary collapse without suffering directly as a result, if it felt that any damage to its reputation would be sustainable. The regulator will therefore again regard policyholders' position as weakened, and hence may demand a bolstering of reserves prior to the separation.

The degree of reserve strengthening the regulator will seek will depend on circumstances. Factors will include the strength of the group and the likelihood of financial support in the pre- and post-transfer set-ups. The regulator will often require an actuarial report supplying best estimate and 'worst plausible estimate', and will look at the strength and the degree of uncertainty of these figures, taking account of any of the following:

- any caveats or exclusions,
- the consistency of the estimates (e.g. of paid v incurred projections),
- the proportion of asbestos, environmental and other latent claims in the liabilities,
- any crudeness in the methods (e.g. benchmarking v exposure-based for asbestos),
- stochastic v traditional methods for worst case estimate,
- the amount of credit taken for independence between lines for worst case estimate,
- whether discounted, and the rate of discount.

The strengthening may be in the form of capital or reinsurance. The latter, in the form of an adverse deterioration cover from best estimate (i.e. current reserves) to worst case, is often attractive to the cedant since it will usually be cheaper than capitalising the reserves to worst plausible estimate level. However, the regulator's aversion to uncertainty will be mirrored by the reinsurer's, and the cedant will find there is no cheap way of getting rid of a highly uncertain loss portfolio. If the reinsurance route is followed, the regulator will need to be assured as to the terms of the cover, especially if it appears of a finite risk nature, and as to the strength of the reinsurer.

6.2.2 Liquidity of assets

There may be a problem if the transfer is into a company whose assets are heavily tied up in trust funds or collateral (such as for letters of credit) for claims of existing policyholders. The regulator would need to be satisfied that the company would be likely to have sufficient liquid assets to pay the claims of the transferring policyholders even if these deteriorated and/or had to be paid more quickly than expected. Some ring-fencing of assets in favour of the transferring claims might alleviate the position, or the company might increase its liquid assets by various means.

6.2.3 Non-financial resources

Apart from seeking sufficient financial strength to be likely to be able to pay claims, the regulator will look at the accepting company's non-financial resources. In particular, the regulator may object to the transfer if the insurer does not appear to have sufficient expertise in the lines of business being transferred. An attractive solution to this would be for the claims staff which currently handle the portfolio in the ceding company to be transferred as well, especially if the alternative would be redundancy.

7 Example

7.1 Background

A client instructed its broker to obtain quotes for an adverse development cover for an unlimited cover excess of its current net reserves of 40 million for underwriting years to 2001. The classes of business were Motor, Employers' Liability and Public Liability. No further information was given as to its motives.

The net reserve of 40 million was based on its own internal actuarial report that had been written for year-end 2001. The client had obtained an equivalent external reserving report from a firm of consulting actuaries. The consulting actuary's best estimate of net reserves was 41 million. The difference was not viewed as material. Neither of these reports had been written with an LPT in mind and neither specifically addressed the possible variability of outcomes from these best estimates.

7.2 Methodology

Before approaching the market the broker carried out an analysis of the data supplied. This served a number of purposes:

- to put the internal and external reserves into context,
- to understand how well the data can be modelled,
- to assess the variability of the net reserves,
- to compare quotes against a technical price and determine their value for money,
- to assess the effect of introducing a cap on the unlimited layer,
- to assess the effect of increasing the attachment point from 40 million,
- to consider non-traditional (e.g. finite risk) solutions.

7.3 Using graphs to illustrate the effect of best estimate

Loss development triangles were analysed for the three classes of business to estimate the ultimate losses and the variability in the ultimate losses. The approach was to analyse the account in an unbiased way in much the same way that a typical actuary, working for a reinsurer, would do. Payment patterns were also derived for each of the classes of business.

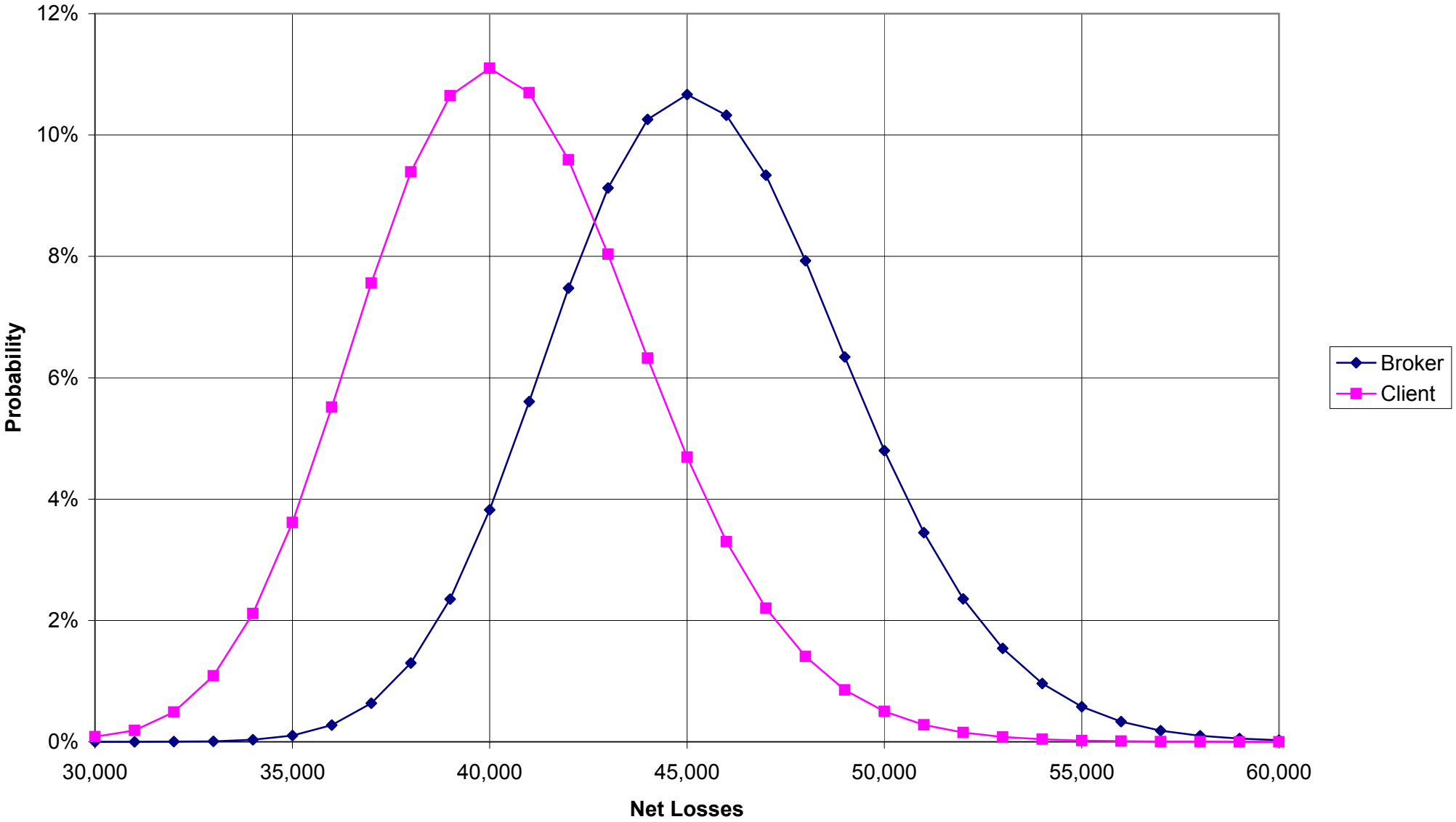
The broker estimated total net losses of 45 million. The net losses and variability (coefficient of variation) was calculated for each class of business. The variability for the total net losses was calculated assuming independence between the three classes.

The standard error of the net losses of 45 million was 3.761 million (section A of spreadsheet output below). Applying the same coefficients of variation to the internally-set net reserves (40 million) suggests a standard error of 3.619 million as a measure of the variability attributable to the cedant's estimate.

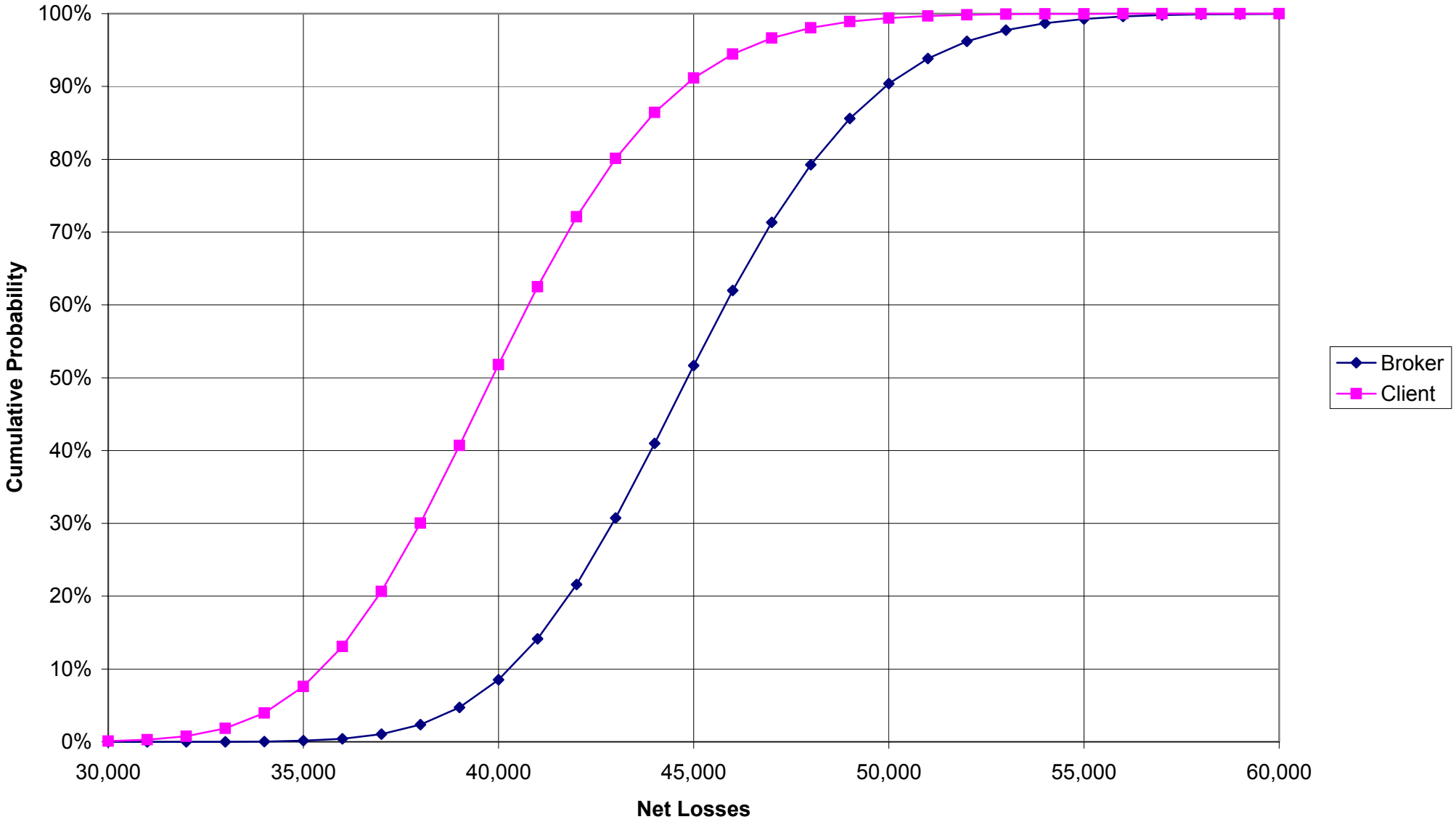
By making a further assumption that the variability of the net losses follows a lognormal distribution we can graph both the distributions and compare them against the requested level of cover.

Graph 1 illustrates the two distributions in the format of probability density distributions. The means are large and the coefficients of variation relatively small and consequently the lognormal distributions are very close to normal distributions. Both distributions tail off at approximately 15 million excess of their mean.

Graph 1) Variability of Net Losses
Lognormal Approximation



Graph 2) Variability of Net Losses
Lognormal Approximation



Graph 2 illustrates the results as cumulative distribution functions. The graph shows the obvious point that the client expects the net reserves of 40 million to be exceeded approximately 50% of the time. The broker analysis suggests that 40 million would be exceeded approximately 90% of the time.

7.4 Ball-park cost of cover

Using the second of these graphs, the cost of various covers can readily be estimated. The cost is the integral to the left of the cumulative probability curve in graph 2, limited by the deductible and the upper limit. The integral can quickly be assessed by counting squares.

For example, suppose the broker wishes to compare the cost for unlimited cover excess of 40 million according to (i) the client's estimated net reserve, (ii) the broker's estimated net reserve. The approximate numbers of squares between the 40 million vertical and the curve are (i) 3, (ii) 10. Each square costs 0.5 million (5 million x 10%) so the rough costs of cover before discounting, expenses and loadings are (i) 1.5 million, (ii) 5 million. Although crude, this is already sufficient to warn the client that the cost will be three times greater than he expects, if reinsurers share the broker's view as to expected losses.

Similarly the broker can suggest to the client accepting a higher deductible, and can quickly assess the effect on the premium. Based on the broker's best estimate of 45 million losses, raising the deductible to (iii) 45 million, (iv) 50 million reduces the number of squares to (iii) 3, (iv) 0.4 and so reduces the cost from 5 million to (iii) 1.5 million, (iv) 0.2 million. Again this is sufficient to give the client a fair picture of his options.

The accuracy of the square-counting could obviously be improved by using a finer grid, or analytical calculation of the results.

7.5 The Market Response

The markets who were approached would not offer unlimited cover, but one reinsurer quoted a fixed premium of 7 million for cover of 15 million excess of 40 million. This reinsurer's assessment of the net losses was 47 million. (This means that the 7 million premium is just what the graph would have projected as the pure risk premium – try to visualise the broker's curve shifted 2 million to the right – suggesting that loadings and discounting roughly cancel.)

Other quotes were obtained for an Alternative Risk Transfer solution, but we do not discuss these further. The reason for obtaining ART quotes and also the reason that the markets offer them is that pure risk transfer deals struck at near the expected losses do not appear good value, as they are working layers of cover. Consequently an ART solution gives credit for outcomes near to the expected losses but charges more for results further away.

7.6 Modelling the range of outcomes

The run-off of the business was then modelled and the net present value of the losses calculated. Variables were introduced to test:

- different projected ultimates (reserve deterioration),
- accelerated payment patterns,
- different investment returns.

The accelerated payment patterns for each class were derived by multiplying the base cumulative payment percentage by the same factor, and ensuring that the result did not exceed 100%. By way of example for motor:

Period	Base (100%)	200% acceleration	300% acceleration
1	25%	50%	75%
2	45%	90%	100%
3	65%	100%	100%

This is purely a pragmatic method, and there are many alternatives.

Sections B,C,D of the spreadsheet output below illustrate 10% reserve deterioration, 10% payment acceleration and 5% interest. Note that all amounts shown on the spreadsheets are in thousands. This scenario produces FGU losses of 49.5 million with present value of 44.372 million.

7.7 Analysing the quote

The reinsurance deal of 15 million excess of 40 million was added to the existing model (section E of the spreadsheet) and the net present value of payments made by the reinsurance contract calculated. In the scenario described above, the reinsurer's payment is 9.5 million and the value of the contract is –0.611 million.

By using the two-way table function in Excel it is easy to test and view the results of different scenarios. Section F shows tables of reserve variability against accelerating claim payments, and of investment return against accelerating claim payments. The illustrated scenario with net present value of –0.611 million appears in bold in both tables.

Section A) Reserve Analysis (shaded figures represent operator inputs)

Client Analysis

Class	Net Ultimate Losses	Current Net Paid	Net Reserves	Coefficient of Variation	Implied Standard Deviation
Motor	151,000	120,000	31,000	2%	3,020
EL	11,000	8,000	3,000	15%	1,650
PL	16,000	10,000	6,000	7%	1,120
Total	**178,000**	**138,000**	**40,000**		**3,619**

Broker Analysis

Class	Net Ultimate Losses	Current Net Paid	Net Reserves	Coefficient of Variation	Implied Standard Deviation
Motor	154,000	120,000	34,000	2%	3,080
EL	12,000	8,000	4,000	15%	1,800
PL	17,000	10,000	7,000	7%	1,190
Total	**183,000**	**138,000**	**45,000**		**3,761**

Section B) Reserve scenario : 110%

Class	Net Reserves	Current Net Paid	Net Incurred
Motor	37,400	120,000	157,400
EL	4,400	8,000	12,400
PL	7,700	10,000	17,700
Total	**49,500**	**138,000**	**187,500**

Section C) Payout acceleration scenario : 125%

Year	Base payment pattern			Base cumulative pattern			Accelerated cumulative pattern		
	Motor	EL	PL	Motor	EL	PL	Motor	EL	PL
1	25%	1%	3%	25%	1%	3%	31%	1%	4%
2	20%	8%	10%	45%	9%	13%	56%	11%	16%
3	20%	23%	16%	65%	32%	29%	81%	40%	36%
4	15%	19%	14%	80%	51%	43%	100%	64%	54%
5	10%	18%	12%	90%	69%	55%	100%	86%	69%
6	3%	11%	10%	93%	80%	65%	100%	100%	81%
7	3%	12%	8%	96%	92%	73%	100%	100%	91%
8	2%	2%	7%	98%	94%	80%	100%	100%	100%
9	1%	2%	6%	99%	96%	86%	100%	100%	100%
10	1%	1%	5%	100%	97%	91%	100%	100%	100%
11	0%	3%	5%	100%	100%	96%	100%	100%	100%
12	0%	0%	4%	100%	100%	100%	100%	100%	100%
13	0%	0%	0%	100%	100%	100%	100%	100%	100%
	100%	**100%**	**100%**						

Section D) Interest rate scenario : 5.0%

Year	Accelerated payment pattern			Accelerated payments			Total of all classes		
	Motor	EL	PL	Motor	EL	PL	FGU	Cum FGU	NPV FGU
1	31%	1%	4%	11,688	55	289	12,031	12,031	11,741
2	25%	10%	13%	9,350	440	963	10,753	22,784	9,994
3	25%	29%	20%	9,350	1,265	1,540	12,155	34,939	10,759
4	19%	24%	18%	7,013	1,045	1,348	9,405	44,344	7,929
5	0%	23%	15%	0	990	1,155	2,145	46,489	1,722
6	0%	14%	13%	0	605	963	1,568	48,056	1,199
7	0%	0%	10%	0	0	770	770	48,826	561
8	0%	0%	9%	0	0	674	674	49,500	467
9	0%	0%	0%	0	0	0	0	49,500	0
10	0%	0%	0%	0	0	0	0	49,500	0
11	0%	0%	0%	0	0	0	0	49,500	0
12	0%	0%	0%	0	0	0	0	49,500	0
13	0%	0%	0%	0	0	0	0	49,500	0
	100%	**100%**	**100%**	**37,400**	**4,400**	**7,700**	**49,500**		**44,372**

Section E) Net present value of reinsurance contract
No restriction on payment

Layer	15,000	xs	40,000
Premium	7,000		

Year	Cum FGU Incurred	Cum RI Incurred	RI Max Cumulative Payment Schedule	Cum RI Paid	RI Paid	NPV RI Paid	NPV Contract	Cum NPV Contract
2002							7,000	7,000
2003	12,031	0	15,000	0	0	0	0	7,000
2004	22,784	0	15,000	0	0	0	0	7,000
2005	34,939	0	15,000	0	0	0	0	7,000
2006	44,344	4,344	15,000	4,344	4,344	3,662	-3,662	3,338
2007	46,489	6,489	15,000	6,489	2,145	1,722	-1,722	1,616
2008	48,056	8,056	15,000	8,056	1,568	1,199	-1,199	417
2009	48,826	8,826	15,000	8,826	770	561	-561	-143
2010	49,500	9,500	15,000	9,500	674	467	-467	-611
2011	49,500	9,500	15,000	9,500	0	0	0	-611
2012	49,500	9,500	15,000	9,500	0	0	0	-611
2013	49,500	9,500	15,000	9,500	0	0	0	-611
2014	49,500	9,500	15,000	9,500	0	0	0	-611
2015	49,500	9,500	15,000	9,500	0	0	0	-611
					9,500	**7,611**	**-611**	

Section F) Two way tables showing net present value of contract
No restriction on payment

		Reserve Scenario=>				
		100%	**105%**	**110%**	**115%**	**120%**
Payment acceleration	**100%**	3,636	1,963	231	-1,536	-3,304
	125%	3,147	1,268	**-611**	-2,489	-4,368
	150%	2,976	1,087	-880	-2,848	-4,815
	175%	2,882	915	-1,061	-3,037	-5,013
	200%	2,798	818	-1,163	-3,143	-5,124
Ultimate losses		**183,000**	**185,250**	**187,500**	**189,750**	**192,000**
Reserves		**45,000**	**47,250**	**49,500**	**51,750**	**54,000**
Lognormal approxn		**48%**	**29%**	**14%**	**6%**	**1%**

		Interest Rate=>				
		3%	**4%**	**5%**	**6%**	**7%**
Payment acceleration	**100%**	-729	-230	231	657	1,050
	125%	-1,302	-947	**-611**	-293	8
	150%	-1,480	-1,173	-880	-601	-335
	175%	-1,598	-1,324	-1,061	-810	-568
	200%	-1,665	-1,409	-1,163	-927	-700

The two-way table approach can be used on any suitable metric, for example return on equity or profitability. It is just necessary to be able to define the appropriate metric in the model. Analysing a three-way or more table would be better but difficult to view!

Many reinsurers and brokers use this approach to stress test the resilience of a deal. It is difficult to model the true underlying variability of the loss data and so they often resort to stress testing. Of course modelling the variability adds further insight into the transaction.

The process shows the reinsurer its upside and downside on a transaction and how sensitive these are to various changes in assumptions. It allows the reinsurer to adjust features to make the contract more acceptable. A particular feature of ADCs or LPTs is their sensitivity to acceleration in claims payments as these have a dramatic impact on the net present value calculation of the contract. One way to mitigate this effect is to introduce a schedule of maximum payment schedules.

7.8 Using the two-way tables to review profitability

Based on broker analysis of ultimate net reserves and base expected payment pattern the net present value of the deal is 3.636 million. The greatest upside to the reinsurer is to receive a premium of 7 million and have no losses to pay. The worst downside is 8 million when the reinsurer pays the full limit after receiving a premium of 7 million. The earlier the reinsurer has to make this total payment the lower the net present value.

Using the base payment pattern, if the reserves deteriorate by 10% (losses 110% of base) the reinsurer's net present value falls from 3.636 million to 0.231 million. If reserves

deteriorate by 15% then the reinsurer makes a loss on the contract, as the net present value is now negative at -1.536 million.

The reinsurer can also consider the effect of an acceleration of the payment pattern. Using the 10% deterioration in reserves, if claim payments accelerate by 25% the reinsurer's net present value falls from 0.231 million to a loss of -0.611 million. Accelerating the claims payment by a further 25% to 50% reduces the net present value further to -0.880 million.

7.9 The transaction with a payment limits schedule

Now suppose that the reinsurer does not wish to make a loss when there is 10% reserve deterioration and 25% acceleration of claim payment. The reinsurer could introduce a payment schedule to limit the timings of any payments but still provide the full 15 million of limit over the duration of the contract. For example, there could be nothing payable for three years, a maximum of 2.5 million paid in year 4, then a further 1 million a year for 8 years followed by the balance.

By adjusting the payment schedule (section E2) it is possible to adjust the net present values in the two-way table (section F2). If the reinsurer can impose such a restricted payment schedule, this will change the net present value loss of -0.611 million into a profit of +0.014 million.

Section E2) Net present value of reinsurance contract
Payments restricted to 2,500 in 2006 then 1,000 p.a. until 2015

Layer	15,000	xs	40,000
Premium	7,000		

Year	Cum FGU Incurred	Cum RI Incurred	RI Max Cumulative Payment Schedule	Cum RI Paid	RI Paid	NPV RI Paid	NPV Contract	Cum NPV Contract
2002							7,000	7,000
2003	12,031	0	0	0	0	0	0	7,000
2004	22,784	0	0	0	0	0	0	7,000
2005	34,939	0	0	0	0	0	0	7,000
2006	44,344	4,344	2,500	2,500	2,500	2,108	-2,108	4,892
2007	46,489	6,489	3,500	3,500	1,000	803	-803	4,090
2008	48,056	8,056	4,500	4,500	1,000	765	-765	3,325
2009	48,826	8,826	5,500	5,500	1,000	728	-728	2,597
2010	49,500	9,500	6,500	6,500	1,000	694	-694	1,903
2011	49,500	9,500	7,500	7,500	1,000	661	-661	1,243
2012	49,500	9,500	8,500	8,500	1,000	629	-629	614
2013	49,500	9,500	9,500	9,500	1,000	599	-599	14
2014	49,500	9,500	10,500	9,500	0	0	0	14
2015	49,500	9,500	15,000	9,500	0	0	0	14
					9,500	**6,986**	**14**	

Section F2) Two way tables showing net present value of contract
Payments restricted to 2,500 in 2006 then 1,000 p.a. until 2015

		Reserve Scenario=>				
		100%	**105%**	**110%**	**115%**	**120%**
Payment	**100%**	3,636	1,963	265	-1,108	-2,358
acceleration	**125%**	3,147	1,415	**14**	-1,235	-2,458
	150%	2,998	1,408	14	-1,235	-2,458
	175%	2,961	1,408	14	-1,235	-2,458
	200%	2,961	1,408	14	-1,235	-2,458
Ultimate losses		**183,000**	**185,250**	**187,500**	**189,750**	**192,000**
Reserves		**45,000**	**47,250**	**49,500**	**51,750**	**54,000**
Lognormal approxn		**48%**	**29%**	**14%**	**6%**	**1%**

8 Conclusions

Loss portfolio transfers can be used to reduce risk, to exit an area of business or to improve published solvency. The accepting company can profit through specialization, economies of scale or greater investment returns. Transfers range from formal legal transactions requiring approval from the regulator, to private reinsurance contracts invisible to the underlying policyholder. They can benefit policyholders and shareholders in addition to the companies involved, and can attract the attention of regulators, auditors and tax authorities.

The premium must allow for the expected loss on the portfolio, the cost of capital needed to support the uncertainty, and the value of future investment returns generated. Any of these can be the most important element, depending on the layer protected and the finite vs traditional nature of the contract. Allowance is needed for expenses, profits, tax and accounting implications, and any non-financial resources transferred.

If a premium cannot be agreed for the terms proposed, or the regulator objects, the design of the contract can be changed. Limits and deductibles can be altered, payment schedules can be included, reserves can be strengthened, difficult areas of business can be dropped or reinsured, or profit commissions can be introduced to share the risk. Such options can be explored in both deterministic and stochastic financial models and presented to the interested parties using visual tools such as graphs and grids, as illustrated in our example.

Overall, loss portfolio transfers are time-intensive transactions that can have a positive effect for both cedant and accepting insurer if the design and price are appropriate. The

actuary can add great value in achieving a design and a price that achieve the goals of both parties and meet the requirements of third parties.

The members of this working party have achieved a more balanced insight into loss portfolio transfers as a result of bringing together our many different viewpoints, and we hope that the reader will be equally enlightened. Our only regret has been the confidentiality that prevented the use of actual examples to illustrate the pricing principles.

A Appendix - Actual Transfers

A 1 CGNU (Aviva) / White Mountain

CGNU had a change to their global strategy and wished to exit the North American Property/Casualty market. The business was highly dependent on independent brokers and so had large distribution costs. It was the 16th largest US P/C insurer at the time of the transfer. They wanted to keep their Life business as a going concern, but needed to dispose of the remaining parts of the business.

White Mountain is a holding company domiciled in Bermuda. It owns numerous insurance and reinsurance companies mainly in North America, but also in Bermuda and other territories. It acquired CGU to expand its market share in the US.

The deal was completed on 1st June 2001. White Mountain paid $2.1bn for the controlling equity of CGU and repaid $1.1bn of debt to CGNU. The full cost could be approximately broken down into:

- $875m debt financing,
- $741m convertible equity,
- financed by management and private investors, as well as a number of banks,
- $600m for US Life and Canadian business sold back to CGNU,
- the remaining cost was borne by White Mountains from existing assets.

The value of the transferred net liabilities as at 4Q1999 was $1bn, mostly motor and property with some workers comp and marine. The terms of the deal included:

- $2.5bn stop loss cover for discontinued operations (prior to 1987, mainly asbestos & environmental), at a cost of $1.25bn,
- strengthening CGU's reserves by $200m at 4Q2000,
- $260m seller note issued to CGNU repayable at White Mountain's option.

The points of interest are the stringent terms imposed to protect the buyer – the reserve strengthening and the stop loss cover – and the loan note inserted to provide a little compensation to CGNU if the run-off was favourable. In the event the deal was delayed and before it could be sealed the book deteriorated to the point that CGNU had to strengthen reserves by $800m and estimated a £1bn loss on sale. So it appears that White Mountain's caution in negotiating protective terms was well justified, while with hindsight CGNU's insistence on the loan note appears optimistic.

A 2 Selection of lesser deals

We would have liked to investigate and present the motives and details of actual deals. However, these are generally unavailable since private deals are often bound by confidentiality agreements, especially where companies such as Equitas are concerned. For schedule 2C transfers, though, (in future FSMA Part VII transfers) the basic points are announced publicly. The table on the next page gives a flavour of the more routine transfers of various sizes in the public domain that occurred during 2000-01:

Transferor	Transferee	Business transferred	Reason	Complications
CGNU	Hibernian	Irish branch	Intra-group tidying	Reporting concession.
NAC Re (UK)	XL Re (UK branch)	All	Intra-group consolidation. Transferee will close.	
Aegon (UK)	Guardian Assurance	All (in run-off)	Parent wants to close transferee and remove excess capital	
Abbey National Healthcare	NU	All	Parent wants to close transferee as could not reach critical mass for PMI business.	Two stages to give NU time to get systems in order.
Nippon Europe	Hamburg Insurance	German branch - unauthorised domestic business	Main business is Japanese clients. Also wrote some domestic business, tried to stop but agent went on using Nippon paper. 100% reinsured but need to transfer to authorised insurer.	
ORG Re (UK)	RiverStone	All (in run-off)	Intra-group consolidation. Transferee will close. No net transfer as already 100% reinsured within group.	Reinsurer will novate cover to RiverStone.
RSA	NU International	All Gibraltar business except health insurance	Exit Gibraltar as part of group re-focus	Two stages, the second under FSMA.
Welsh Baptist	Ecclesiastical	All	2-man operation cannot afford extra regulation of GISG and FSMA. Transferee will close.	Business 100% reinsured into CGNU.
BUPA CWHSF (*)	BUPA Insurance	All	Restructuring. CWHSF will close.	

(*) Coventry and Warwickshire Hospital Saturday Fund