RESTRUCTURING MUTUALS—PRINCIPLES AND PRACTICE

by The Bonus and Valuation Research Group of The Faculty of Actuaries

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1. INTRODUCTION

1.1 This paper owes its existence on two counts to the late Jim Souness whose term of office as President of the Faculty coincided with the bulk of our research. Firstly, as President, he encouraged Faculty research groups to be active and to produce material worthy of sessional papers. More directly it was the late President who funnelled our general investigations of life office management (which had continued after the Group's 1987 sessional paper) towards the issue of demutualisation.

There have been several notable demutualisations of life offices in recent years, yet there is little published research in the UK other than case studies into the actuarial issues which these restructurings raise for the profession. Furthermore much of what has been published pertains to overseas regimes not subject to UK-style regulation. However at the time of writing we are aware that another paper (reference 20) was being written concurrently, and it relates specifically to the UK.

We have therefore attempted to explore some different aspects of restructuring in a more detached fashion and we have devoted less space to the commercial and UK legal aspects which were covered comprehensively at the Faculty's sessional meeting on Demutualisation which took place on 17 April 1990 (reference 2.). We hope that this paper is a useful reference for any actuary who might:

(a) preside over any proposal to restructure his or her own life office;

(b) act for a purchaser where the demutualisation is part of a take-over or merger; or

(c) act as an independent actuary in a transfer of business.

Furthermore, much of the modelling work undertaken by the group and described in section 6 of the paper involves the comparison of the various courses of action available to the office, including remaining open as a mutual. The results should, it is hoped, make the paper of interest to any actuary involved in the financial management of a life office whether or not he or she finds himself/herself in one of the roles described in (a) to (c) above.

Our work was set in the context of UK life office business. But just as we have gained

from reading overseas material, we hope that our paper will be useful to overseas actuaries. Some of the financial aspects of demutualisation are so fundamental that they are of interest irrespective of variations in local business and regulatory frameworks.

1.2   Although there is considerable overlap, our research can be conveniently divided into three categories—actuarial principles or philosophy; case studies and territorial variations; modelling.

The first, which forms section 2, was the most contentious part of the paper for the authors to write. Unless the Research Group is an unrepresentative sample, there is a wide variety of opinions held by actuaries in this field. No doubt other opinions will be voiced when this paper is presented.

The second thrust of our research is summarised in section 3. This offers the opportunity to examine how the different supervisory frameworks relate to the principles discussed in section 2. For the sake of brevity, and in view of previous publication of some of the case studies, the detailed work we undertook forms Appendices 2-5.

The third category of research was to run different restructuring scenarios on a hypothetical computer model office. We regarded this as a useful objective approach which counter-balanced many of the considerations which are wholly (and necessarily) of a subjective nature.

A model can be criticised as over-simplifying real world complexities. Also the results can only be trusted to the extent that underlying parameters are reliable. However, despite these criticisms, the group felt that the model could lead us to challenge a few conventional wisdoms, pose some questions which might otherwise not have been asked, and measure the relative importance of various inputs.

Time has not permitted us to model the full range of possible restructurings which we can envisage. What investigations we have concluded are described in sections 4-6.

2. BACKGROUND CLIMATE

2.1   Why has demutualisation become a consideration? Case studies of recent demutualisations do not necessarily help to answer this question as in each case specific conditions apply.

It may be that restructuring is precipitated by such as a severe deterioration in asset values (eg. the Stock Market crash of October 1987), rapid unforeseen changes to distribution channels (eg. polarisation in the wake of the Financial Services Act 1986), sudden loss of customer confidence (eg. bad trade press stemming from rumoured weakness), or the introduction of new regulations. Perhaps the most extreme example would be the regulatory authority making a more stringent scrutiny than on earlier occasions.

In this section we will discuss the underlying pressures which may persist in the long-

term and consider whether mutuals might in future years be faced with the need to restructure.

2.2   Perhaps the greatest pressure to restructure arises from the need for any life office, be it proprietary or mutual, to maintain a certain "critical mass" in order to support the capital expenditure needed for its operation. Administrative and sales functions will often be self-supporting in the sense that their costs arise per policy, or per client. However marketing, development and computing project costs will generate overheads, and if an office cannot grow fast enough that these overheads can be spread over a larger 'in force', it will become uncompetitive.

In such circumstances a proprietary office may seek more capital by borrowings, or further issues of equity. Of course it will only be able to secure finance if potential investors can be convinced that profits from future new business are likely to provide an adequate return on that capital. But the options are far less clear for a mutual in the same circumstances, as it is unable to raise further capital—irrespective of how efficiently it would be able to use that capital.

One route for such a mutual would be a friendly merger with another mutual with a similar philosophy faced with the same 'critical mass' difficulty. Even if a prospective mutual partner was of similar financial strength, the new office post-merger would be able to spread development costs over a larger "in force".

However for the friendly merger to be viable the two partners would need to have complementary strengths and needs. If this were not the case, the stronger office would be bound to question whether the potential weakening that is induced by the smaller partner would be outweighed by the attraction of greater size. If the answer is negative and the offices could not find more suitable partners, demutualisation or closure would seem to be the only options. Some price would then be found which would make a partnership viable—although it does not necessarily follow that that price would make demutualisation (compared to a closed fund option) attractive to existing policyholders.

2.3   It is not clear how quickly life offices are now approaching the stage where they have to worry about being big enough. What is clear is that development costs continue to escalate as contracts and their support systems become more sophisticated; as distribution channels become more diversified; and as offices need a wider range of products to maintain a presence in some of these channels.

Perhaps then the next ten years will see even more restructurings of proprietary and mutual offices as these pressures build. The exact timing is of course unpredictable— especially where it may be affected by stockmarket shocks, or changes to distribution channels.

2.4   For many mutual life offices who have sold their policies through the independent

broker market, it is the threat to that market which is the greatest challenge. Perhaps as a result of the Financial Services Act 1986, the broker market for Ordinary life assurance business has contracted significantly (rather less so for individual and corporate pensions) as the vast majority of clearing banks and building societies have elected to become tied agents, either tied to an independent partner, or tied to some newly created subsidiary life office within a wider financial services group. The creation of large national estate agency chains under the ownership of the larger building societies and composite insurers has led to a further contraction of the broker market.

Again we observe that a life office's size is an important factor. The larger life offices have been able to negotiate tied agencies with the biggest of the retail outlets and so maintain (or increase) their market share without compromising their independence to any great extent. In contrast, smaller life offices face a dilemma. If they choose independence they could face a declining market share unless they can open up direct or off-the-page sales, or find a niche market within the remaining independent broker market. The alternative is cooperation with a relatively larger retail outlet who might dominate the partnership and, in these circumstances, a mutual might gradually lose its independent identity—and ultimately its mutual status.

2.5   A further constraint on a mutual's "manoeuvering space" is the increasing emphasis on judging offices by their financial strength. While this seems sensible, it creates problems, exacerbated by arbitrary statutory regulations, in that today's strong offices, flooded with new business attracted by apparent strength, could be destined to be the weaker players tomorrow. Meanwhile today's weak offices may not attract enough new business to spread their overheads widely enough to survive long enough to be judged in a more favourable light alongside their peers.

2.6   *Raison d'etre*

A proprietary office, be it long-standing or recently demutualised, exists to maximise the profits for its shareholders. Because it makes profits by providing policyholders with a service and with value for their money, it is obliged to treat policyholders fairly (although less competitive products may sell well through a tied salesforce). It might make more profit for a short while if it was to disregard the policyholders' best interests, but in the long run such a strategy should make it vulnerable to competition. With profit policyholders are in a special category, since their funds may provide the larger part of the office's capital, and the shareholders' share of the profits on participating business is usually restricted to a small proportion of the profits which are actually distributed. Provided that the office can sell acceptable products (with profit or otherwise) and still make a profit then it has every reason to continue to write new business.

Many life offices have been mutual since birth. The founders' intention was a pooling of their risks with no third party to profit from the enterprise. The concept of with profits

policies developed naturally within the first mutuals as a means of distributing surpluses swollen by the necessarily conservative bases adopted in the early days. Over time, the financial needs of the public served by such mutuals have changed. The range of contracts offered by the life offices has developed to serve these needs and in general the product range of mutual life offices naturally tend to be similar to those of proprietary life offices operating in the same market. The raison d'etre of a mutual however remains to offer financial services to the public it has always served.

This is fundamentally different to that of its proprietary counterpart as described above. The mutual life office exists to offer financial services. The proprietary life office exists to maximise profits for shareholders through offering financial services.

However it needs also to be recognised that several life offices were once proprietary but in effect mutualised by the life fund buying out the interests of shareholders. In at least one such mutualisation, it was the conflict of interests between with profits policyholders and shareholders which prompted the action by the life office management. In such a case, the raison d'etre of the mutualised life office may differ from that of a mutual as stated above and be interpreted as to write with profits business and maximise profits for with profits policyholders through offering other financial services.

Over time, memories of the reason for mutualisation may fade, and in practice, life offices which have always been mutual may have been managed with objectives better described by the raison d'etre of the last paragraph than by that described earlier. The practical differences in the face of fierce competition in the non-profit markets may be negligible. However when considering the restructuring of a mutual life office, it is important that management has a clear idea of whether it regards the non-profit business only as a source of profit for with profit policyholders, or as a part of the product range it uses to offer financial services—to be written as competitively as possible subject to considerations of equity and the ability of the office to service its current policyholders. The range of policyholders entitled to vote may have a bearing on which philosophy is adopted.

2.7   For some actuaries the raison d'etre of a life office can be reduced to answers to the question, "Why do offices write new business?" In the case of a mutual, if it would be worth more to its members if it wound up, as might be the case in a life office with a large estate, then there ought to be some good reason for writing new business. The following reasons might be put forward.

(a)   Its Articles of Association or Act of Parliament require it to admit new members.

(b)   Its founders must have admitted new members, or it would not still exist. Therefore its original aims must have included its own continuation.

(c)   The institution has already served several generations of "owners" and one of its aims, in fact if not in law, is to continue to do so.

(d)   The mutual's capital may have been left behind by past generations of "owners" and it is arguable that the current generation are its custodians and not its "owners".

(e)   The current membership understood that the office was a continuing entity when they joined, and they should not reasonably expect it to close.

(f)   There may be a strong desire on the part of the management to preserve the institution, in order to maintain its own independence and perhaps to protect a loyal workforce.

(g)   Winding up would cost more than continuing to trade.

Some of these might suggest that a mutual should periodically weigh up the benefits of closure; we would be interested to know how many mutuals do so!

It is perfectly possible for the concept of mutuality to be limited at the outset to a single closed group of members with no new members being allowed. Indeed, the first building societies were closed mutual financial institutions; permanent building societies were a later innovation. However, perhaps for some of the reasons listed above, the practice or convention of writing new business is firmly established in mutual life offices.

2.8   *Actuarial Principles—Reasonable Expectations*

The actuary's overriding guiding principle must be to safeguard the policyholders' reasonable expectations. A Joint Institute/Faculty Working Party was set up to examine the issue of policyholders' reasonable expectations (PRE). Its report was issued at the seminar on Current Issues in Life Assurance in Birmingham on 10 July 1990. The principal conclusions were:

(i)   In the normal day-to-day actuarial management of a life office PRE is virtually synonymous with equity and the almost universal method for measuring it's asset-share calculations (it is,   naturally, widely accepted that there are differing ways of calculating asset-shares).

(ii)   In the normal course of events any free estate in an office does not form part of the reasonable expectations of (with profit) policyholders, since they could not have "reasonably expected" its distribution when they effected their policies.

(iii) In the circumstances of a 'major change' in a life office (such as demutualisation), policyholders may reasonably expect that the proposed new arrangements do not disadvantage them as compared with the option of a closed fund. Our profession therefore should make the advantages and disadvantages of each option clear and recommend a closed fund if it is in the existing policyholders' interests.

(iv)   For with profits business gradual change is acceptable, particularly if commun-icated to policyholders, whereas sudden   change is not. Changes in the

company's levels of payment would be by reference both to previous levels of payment and to standing in the market place.

(v)   For non-profit business any changes should be consistent with market practice. Thus reflecting changes in market levels of charges, perhaps due to inflation, is reasonable; increases to recoup new business expense overruns are not.

We define 'additional estate' in section 4.4. Briefly, in the context of a with profits fund, it is the difference between the total assets and the aggregate asset shares. We assume that this is the same as the meaning of the term 'free estate' used by the Working Party.

2.9   The only one of these conclusions which we think is contentious is point (iii). In effect, we are to assume that reasonable expectations suddenly change at the instant when a restructuring takes place, and the current with profits policyholders at that point in time can reasonably expect that they will be no worse off than they would have been had no further business been written, and the estate been distributed amongst them.

An alternative standpoint values the reason for existence of the office and regards the reasonable expectations of the with profits policyholder as unchanged by a management decision to consider the option of restructuring.

From this second standpoint, the estate in the mutual is viewed as of indirect benefit to policyholders, allowing greater investment freedom and higher guarantees, and is never deliberately distributed so long as the raison d'etre remains. Every generation of policyholders (subsequent to the creation of the estate which is assumed to be historical accident) benefits from its existence. It would be improper to give away the funds which make up the estate at the time of a restructuring to any party other than the policyholders, and even questionable whether they should be given away to the current generation of policyholders if it is at the expense of future policyholders.

Point (iii) is only contentious if the additional estate is significant. In such a case, the major change or restructuring may take the form of a merger. In a friendly merger with a similar mutual, the policyholders of the two offices could conceivably be unaffected except for the benefits of spreading overhead costs. It seems no more reasonable for the current policyholders to expect the additional estate to be distributed amongst them at the time of merger than it does while the offices remain separate.

If the restructuring is a demutualisation, the intention may once again be to use the additional estate in much the same way as it has been used in the past (ie. to indirectly benefit the policyholders). In such a case, the additional estate might be used to set up a policyholder trust fund invested entirely in the share capital of the newly demutualised life office; the stated objective of the trust encompassing the former raison d'etre of the mutual office and the indirect improvement of the reasonable expectations of its policyholders. Such an approach fits well with the instinctive management reaction to

maintain its independence, which may be strong in a mutual, but this is not to suggest that instinct should be followed blindly. The possible use of trust funds in this way is not pursued further in this paper.

2.10   Most of us (the authors) began our professional careers in the Scottish mutual life offices, and we can vouch for the existence of a mutual 'culture' (stronger in some offices than in others). It may be described as the belief that being able to look after the best interests of policyholders with no concern for shareholders leads to better invest-ment performance, actuarial management and general strategy. However, there are some who would say that the managers of mutuals are not, in practice, accountable to anyone, leading to exactly the opposite results.

Mutuals themselves are not entirely free of the conflicts of interest which arise when an office's managers have discretion over the interests of a group of policyholders to whom they are not accountable. A mutual which wrote a very large amount of non profit business could find, for example, that it had to follow a conservative investment strategy to secure the non profit liabilities, when it would have been in the interests of the with profits policyholders to pursue mismatching profits for the with profit policies.

2.11   Circumstances may steer or even force a mutual office off the path it has followed in the past. Changes in the market, such as a loss of distribution channels or a move towards more capital intensive products, might lead an office to consider restructuring, in which case it must ensure its objectives are clear.

A merger with another mutual might be considered as the first option since such a move would constitute less of a change in philosophy or raison d'etre; with the right partnership, changes in reasonable expectations would be minimal. However, in the context of a demutualisation with a purpose of raising immediate capital, the office, its appointed actuary, and the regulatory authorities will be governed by both:

(1)   the duty to protect policyholders' reasonable expectations,

(2)   the rigours of the market-place—what price can be asked of, and what price will be offered by, prospective purchasers.

The two are not necessarily consistent. On the one hand an office which has allowed itself to become weak or possibly insolvent may be unable to fulfil the expectations policyholders entertained before these difficulties were known. On the other hand a viable office may achieve a price which allows it to provide returns to with profits policyholders in excess of the previous expectations of the current generation.

In the demutualisation of the Abbey National Building Society, capital was raised by issuing shares to the members. This in practice led to the conversion of deposits into share capital. There is no obvious way in which the same could be achieved for a mutual life office. If a life office demutualised by giving shares to policyholders without raising

capital, the office would effectively convert policyholder funds into shareholder funds which may have an adverse effect on the office's taxation position.

This highlights the need for an office to see trouble ahead and take action while it remains viable in the eyes of potential purchasers and can generate goodwill in the marketplace. By demutualising, the office does indeed remain viable and both policyholders and the new owners can benefit.

We might put forward the following expectations as reasonable in the context of a restructuring:

(a) Insured risk should continue to enjoy an adequate level of security.

(b) Policyholders should continue to receive a satisfactory level of service, both before and at a claim date.

(c) The office should maintain the facility to exercise options, or arrangements should be made with other offices to allow options to be exercised where it might not be possible for the original office to honour them. For example, it may not be possible to exercise increment options under pensions policies if the office no longer writes new business.

(d) Current policyholders' benefits under any proposed restructuring should not be less than they might realistically have been had the office continued to trade as a mutual. Note that this does *not* say that the policyholders should receive what they expected to receive; the expectations of the policyholders in a weak office may not be realistic.

Item (d) may be irrelevant if the circumstances make it quite impossible to continue to trade as a mutual. Its purpose is to ensure that a mutual office considers continuation as an option, even if this means making some changes.

Having satisfied (a) to (d), should the next priority be either:-

(e) to continue to meet the objectives of the mutual office as they were prior to the decision to restructure, or

(f) to maximise the potential benefits of its current with-profits policyholders and consider the option of closing the fund, allowing for the equitable distribution of any additional estate to its current with profit policyholders?

If those policyholders currently entitled to vote are mobilised to act out of self interest, the management may be obliged to regard (f) as the next priority.

3.   CONSIDERATIONS FROM RECENT CASE STUDIES

3.1   In general UK legislation gives no clear guidance to actuaries on the principles to be adopted. There is no legislation specifically relating to demutualisation and Sections

49 and 50 of the Insurance Companies Act 1982, which were employed in the FS/ Britannia, Federation Mutual and Pioneer Mutual demutualisations but which relate to any transfer of long term insurance business (eg. they were also employed in the London Life/AMP merger), are silent on this issue. Nor has the Research Group seen any constitution of a mutual life office (whether private Act of Parliament or memorandum and articles of association) which gives guidance on the issue. Although some constitutions do make general statements of how funds should be directed after a fund has closed, they do not specify the closure process.

Some general advice is contained in the Guidance Notes issued by the Institute and Faculty to Appointed Actuaries (GN1 and GN8) and to Independent Actuaries (GN15), and in particular 4.4.10 and 4.4.13 of GN15 indicate matters on which Independent Actuaries should report, but in practice the principles are largely determined by the parties involved. These parties include directors and their advisers, the Appointed Actuaries and the Independent Actuary.

The parties also take into account the views of the Insurance Division of the DTI and their advisers in the Government Actuary's Department, without whose agreement to a scheme the parties would be ill-advised to proceed to a Court hearing. The continuity of the involvement of the DTI and GAD is valuable in maintaining consistency of approach from case to case. The following views appear to have emerged.

(i)   While the Court's remit is confined to the relative merits of the status quo and the proposed scheme, the directors should also consider the third alternative of fund closure (and possibly other alternatives) and some discussion of fund closure should be contained in the circular to policyholders.

(ii)   In order to obtain the Court's sanction, the Independent Actuary should conclude that the policyholders will be no worse off under the proposed scheme than under the status quo and, to that end, it is arguably better to present the Court with a strong statement to that effect than with a less positive statement to the effect of a more favourable outcome.

(iii) While the issue has not yet been conclusively tested in the Courts, it is argued that the Court's remit (and hence the Independent Actuary's) does not include the price paid for goodwill (infrastructure, systems etc) and though actuarial appraisal techniques may be used to evaluate it, the figure is ultimately a matter for commercial negotiation.

(iv)   A vote is not required by UK legislation and it may or may not be required by the company's constitution, but it is argued that the DTI and the Court would not in any case support a scheme without formal approval by the members at a general meeting (in fact a ballot was not required by the FS or London Life constitutions although the directors in each case chose to hold one).

3.2   Regulation of insurance companies in the US is a matter for each of the 50 states. Some, but not all, states have specific legislation permitting demutualisation, of which by far the most detailed and demanding is that of New York State (as is the way in almost all regulatory matters); in fact the law on demutualisation runs to 23 pages. It is of interest at the time of writing because the law (and, in all likelihood, the Second Method described in Appendix 5) will govern the proposed demutualisation of The Equitable Life Assurance Society of the US, the largest insurer to attempt to demutualise anywhere in the world. Compared to the UK situation, a number of features are specified which appear to strengthen the position of the existing policyholders in respect of any excess funds over accumulated asset shares.

   (i)   A policyholders' vote is required by law.

   (ii)   Existing with profits business (other than group business) must be operated as a closed block.

   (iii) In addition to the assets allocated to the closed block and the policyholders' equity (which together amount to the accumulated asset shares, as defined in Section 4.2), policyholders are entitled to compensation equivalent to non-transferable pre-emptive subscription rights to all shares and to 10% of the net proceeds of the initial stock offering. Distribution of compensation is restricted to five permitted methods.

   (iv)   A "Policyholders' Preference Account" is established, in effect as a sanction against future liquidation of the company by the shareholders. It is similar to the "additional estate" defined in section 4.4 and represents the "orphan" surplus contributed by past generations of policyholders and, it would seem, any miscellaneous profits such as profit from non profit business, to the extent those profits have not been credited to existing with profits policyholders in the calculation of policyholders' equity.

The position of the Independent Actuary is also relevant. The matters he/she is required to certify are more constricted and more fully specified than in the UK. His/her certificate must be accompanied by a memorandum describing the calculations made and the assumptions used, and both his/her certificate and the memorandum may be publicly disclosed at the discretion of the Superintendent. Given the widespread interest The Equitable demutualisation is likely to attract, and given also the power of the "Fourth Estate" and the consumerist lobby in the US, the Superintendent will be under great pressure to disclose these documents in the case of The Equitable. It will certainly be mentioned in the material distributed in advance of the policyholders' vote.

There have been three significant demutualisations in the US in recent years, viz. UNUM (reference 16.), Northwestern National and Maccabees, all in states other than New York. All three appear to have followed the general approach of the New York law in so far as operating existing with profits individual life business as a closed block and

allocating compensation to policyholders for loss of ownership rights. There are two important differences, however.

(a)   Whereas the compensation to be allocated to policyholders is defined by the formula in the New York law, the amounts in the UNUM and Maccabees cases arose out of discussions between the parties involved; Northwestern National was a special case in which the amount arose mainly out of analogy with the share price of a long-established proprietary branch of the company.

(b)   Whereas the allocation of compensation between policyholders was based on retrospective asset shares in the three recent cases, the New York law requires that the allocation takes into account prospective reserves as well as retrospective asset shares, which can considerably improve the position of policies of shorter duration.

3.3   The policyholders of the National Mutual Life Association of Australasia have approved a scheme which authorises the directors to demutualise the company along lines quite different to those of the UK and US cases. Policyholders retain Board representation, a 75% majority of votes cast at general meetings and a proportionate share of profits. For this purpose profits are calculated as net assets plus deferred acquisition costs and advanced commission less aggregate policy surrender values. There is no attempt to distinguish between profits from future business, which may well require the support of shareholders' capital, and future profits from existing business, which is unlikely to need that support. There is no explicit payment to policyholders for what they give up, ie. dilution of voting rights and Board representation, a share of future profits from existing business and a share of the existing infrastructure etc. to the extent that it contributes to profits from future business. Note, however, that taking liabilities at policy surrender values, to the extent that this understates a realistic value of guaranteed liabilities, inflates policyholders' capital at the demutualisation date and will emerge as reductions in future profits, and hence in the share paid to shareholders. Note also the statement that "when a transfer is made following an issue of shares, some of the amount transferred may be allocated.... for the ultimate benefit of policyholders". The result seems to be that the financial terms will be subject to negotiation between the directors and the new shareholders without further approval by the policyholders.

3.4   The 1984 demutualisation in South Africa of the Southern Life Association, in conjunction with its merger with Anglo American Life was described in reference 16, but, since then, a paper has been presented by J A A Goy (reference 8), one of the actuaries central to the merger. The insight given by Goy merits a reconsideration of the main features, which were as follows:

(i)   Pre-demutualisation with profits business is operated as a closed block. Sufficient assets were allocated to the block to cover a bonus reserve valuation

which allowed for full maintenance of current bonus rates, including terminal and claim bonuses.

(ii)   The "estate" as at the demutualisation date was "frozen" and investment earnings on it allocated between pre- and post-demutualisation business in proportion to liabilities.

(iii)   It was guaranteed that current bonus rates on pre-demutualisation business will not be reduced "unless significantly unfavourable circumstances occur" and that bonus rates on pre-demutualisation business will not be less than those on equivalent post-demutualisation business. To underpin this guarantee a 'guarantee reserve fund' is built up from investment earnings on share capital subscribed by the new shareholders.

(iv)   Post-demutualisation business is written in a separate 90%/10% fund.

(v)   Policyholder trustees were appointed, who in turn have the right to Board representation to the extent of four directors.

(vi)   Existing policyholders had a preferential right to subscribe for shares.

It would seem that the alternative of fund closure was not considered, even though the office "had a large estate in relation to its size".

South Africa saw a further demutualisation in 1987 involving the South African branch of the Norwich Union Life Insurance Society and the Natal Building Society. This scheme also involved trustees elected by the policyholders, and in this case they carry at least 51% of the votes in general meetings. 30% of the shares (which carry voting rights and dividends) were issued to the Natal Building Society. The remaining 70% are held by the policyholder trust and carry voting rights, but dividends are passed back to the policyholders' fund.

3.5   Of the four territories it seems that policyholders have the greatest legal protection in New York State. It entails the disadvantage that they are separated into a closed block, but since proprietary life offices in the US do not as a rule write with profits business, the restructuring in itself will normally imply closure to new with profits business in any case. It would appear that in general policyholders fare better in the US than in the UK and Australia where their compensation depends on the negotiating ability of their directors. In addition to a firm of consulting actuaries London Life employed a merchant banking firm as advisers; this is common when representing the interests of shareholders in the purchase and sale of proprietary companies. FS did not employ merchant bankers, and the main opposition focused on the price paid by Britannia Building Society. At the very least the greater consistency and openness of the New York method would seem to be worthwhile advantages.

In the London Life case one objection was that insufficient information was provided in the original circular to policyholders and a number of meetings were arranged, eg.

with firms of consulting actuaries whose clients were policyholders. It is the Research Group's experience that it is difficult from the documents publicly available in the London Life and FS cases to obtain a total understanding of the actuarial principles which had been used, let alone quantify them. (The Research Group had the benefit of discussions with actuaries central to each case.) The actuarial principles which will be adopted for the demutualisation of The Equitable of the US are already more apparent thanks to the explicitness of the New York Law, and if the Independent Actuary's certificate and memorandum are indeed disclosed, they should add further to the disclosure.

One of the greatest difficulties the Research Group found was that without some evaluation of the accumulated asset shares or of the terminal bonuses prospectively payable to existing policyholders, it is impossible to form a true picture of the overall financial position of the office (and hence of the fairness of any demutualisàtion scheme). C S S Lyon came to a similar conclusion in his paper (reference 17), which eloquently puts the argument for an evaluation to be disclosed for the benefit of policyholders. The Research Group believes his argument is especially valid in the situation of a demutualisation or restructuring.

4.   BACKGROUND TO THE MODEL

4.1   *Introduction*

Demutualisation is not a topic which actuaries have to contemplate in their day-to-day work; we suspect that few life office actuaries will ever have worked out the costs or the consequences of a demutualisation. It was clear to the Group that we would need to see some numbers before we could consider the issues surrounding demutualisation, so we would need to set up one or more model offices. We were particularly interested to test some of the notions which might be termed the "conventional wisdom" of the subject, particularly when we came to the question of closing the fund, as an alternative to demutualising.

While modelling may clarify some of the more objective aspects of demutualisation, there remain many subjective aspects, such as were discussed in the preceding sections.

We hope that our modelling will help to map out the proper domain of these subjective aspects.

The range of factors which might influence demutualisation is vast, and we faced a dilemma. On the one hand, if we tried to include every factor which might be significant, we would be swamped by the results and we might not be able to sift out those of interest; we certainly did not want this paper to be a catalogue of computer outputs! On the other hand, a model which was too simple might give distorted answers to our questions. We tried to strike a balance; what we wanted was a model which would bring out certain key points (which we will discuss shortly) and we found that a relatively simple model gave us plenty of interesting results to digest, and that quite often the answers to one question led to many more questions being asked.

Our treatment of the possible variables in the model may be summed up as follows:

(a) We found two factors which had such significance that we carried them through most of our modelling. These were the pattern of new business written in the years before restructuring, and the level of the estate. Offices which differed in these factors appeared to be qualitatively different.

(b) Other factors (such as the rate of return or the bonus rates) were important, but their influence could be described adequately by sensitivity tests.

(c) Yet other factors which it might have been interesting to model were held to be constant to allow the effects of our chosen few to be considered in more depth. In particular, when modelling a closed fund we did not consider variations in expense efficiency before closure or lapse rates after closure.

The remainder of this section describes the key points which we addressed with the model, and how the model was set up. We begin by defining the terms "asset share" and "additional estate", since these ideas play a central rôle in what follows.

4.2 *Asset Shares and Terminal Bonus*

The asset share of a tranche of identical policies, all taken out at the same time, is defined to be the accumulation of the gross premiums paid, less the expenses actually incurred in respect of those policies, less the death claims arising under those policies. The asset share of one of the policies in the tranche may be taken to be the asset share for the whole tranche divided by the number of policies remaining in the tranche.

Only with-profit policies have been modelled, and therefore the asset share is used in the model to set the maturity and surrender values, and hence (implicitly) the rates of terminal bonus. Maturity values are taken to be not less than 100% of the asset share and, at most policy durations, surrender values are taken to be not less than 95% of the asset share (see Section 5.6).

The following points have a bearing on the results of the modelling.

(a) In principle, the asset share of each policy is accumulated at the net rate of return earned by the office's with-profit fund. This is equivalent to assuming that all asset shares are invested in the same types of asset, and in the same proportions, as the whole of the with-profit fund. Alternatively, the assets of the office may be regarded as a single unitised fund, all the asset shares always being invested in these "units". An office could operate a different asset share philosophy; for example it might invest more of the asset share in gilts as maturity approached, to reduce cross-subsidy between generations of policyholders. However, we preferred to keep this part of the model simple.

A survey of large with-profit offices[6] indicated that the majority use the simple approach described above.

In practice, however, we departed slightly from the ideas above. The money underlying the asset share of each policy is split between gilts and equities in the same proportion as the whole fund, but all the gilts underlying the asset share are assumed to be of the same outstanding term as the policy itself. The gilt content of the whole fund therefore comprises a mixture of gilts of different terms, while the gilt content of a single asset share only comprises gilts of a single term.

(b) An asset share may be negative just after a policy is written, if the expenses are large enough. We assumed that a negative asset share would accumulate at the same rate as a positive asset share. From the point of view of the office, it makes a loan to the policy and the rate of return it obtains is the opportunity cost of that loan.

(c) No charge is made on the asset share of a policy to reflect any valuation or bonus strain on the office caused by writing that policy. Such strains may lead to a more conservative investment strategy for the office as a whole and, unless an appropriate charge is made, there is effectively a cross-subsidy from old to new policies. We assumed that the office had made the philosophical decision not to make any such charge.

(d) The expenses and death claims experienced by a tranche of policies are deducted from their asset share. Since the maturity value is 100% of the asset share, profits or losses made on expenses and mortality are not retained in the fund but are passed through to policyholders via the terminal bonus. On the other hand, surrender values are not deducted from asset shares, which are simply reduced in proportion to the number of surrenders. Profits and losses made on surrenders are therefore kept by the office. When we came to model a demutualised office, the treatment of the surplus transferred to shareholders was important. In some cases, we assumed that such payments *were* deducted from the asset shares, so that the cost of the transfers was ultimately borne by the policyholders, whose terminal bonus would therefore be lower. In other cases, we assumed that such payments *were not* deducted from the asset shares, so that their terminal bonuses were not affected, and the cost was borne by the office.

(e) Only one class of net with-profit business was modelled, so there was no contribution to the asset shares arising from profits on non-profit business, or from any other source.

4.3 *The Financial Background and Outlook*

We modelled offices which might be considering restructuring round about 1990. The histories of the offices before 1990 are given in Section 5; our aim was to give them reasonably realistic pasts. Then, in projecting their futures, we had to make assumptions about financial conditions, in particular the link between rates of return and reversionary bonuses.

We assumed that reversionary bonuses were at their current levels as an historical accident, and that equitable treatment for the policyholders depended entirely upon the terminal bonuses. The outlook for the future was:

(a) Declining maturity values, if the investment performance in future years was less spectacular than the gains over the previous 20 years.

(b) A sharper decline on terminal bonus, because policies would have received, for several years, reversionary bonuses at the high rates prevailing before 1990, giving a higher proportion of guaranteed benefits than in the past.

(c) Pressures to cut reversionary bonuses to maintain solvency.

(d) In the event of a major fall in the market values of the assets, corresponding falls in maturity values, unless or until the level of the guaranteed benefits was reached.

If an office believes that its asset shares may fall to below the value of the guaranteed benefits, it ought to revise its approach to calculating terminal bonus. An office cannot pay out 100% of the asset share during good times, and more than 100% of the asset share during bad times.

When considering a possible restructuring, it would have to be shown that the deterioration in maturity values and terminal bonuses would be more rapid were the restructuring not to take place. An office might find it difficult to present such a case to its policyholders unless an obvious calamity was imminent.

The need to cut reversionary bonuses may present similar problems. After a restructuring, the reduced levels of bonus and, possibly, any constraints on the investment policy, might be blamed on the advocates of the restructuring, rather than on the reasons for the underlying weakness.

4.4 *The "Additional Estate"*

The word "estate" means different things to different people. We will refer more precisely to an "*additional* estate", which we define to be the difference between the

office's total assets and the total of the asset shares of all the office's in-force policies.

The natural measure of the additional estate is the ratio of the assets to the asset shares, or the "A/AS ratio". We will frequently refer to an additional estate of "X% of the asset shares"; this is equivalent to

$$A / AS \text{ ratio} = 1 + \frac{X}{100}$$

Some actuaries may think of the estate in relation to the value of the liabilities, either on a realistic basis or on a conservative basis. Some authors split the estate into two parts, one being the margins in the valuation reserves and the other being the investment reserve. However, if an office aims to pay out 100% of the asset share on maturity, and provided that reversionary bonus declarations have not led the office to guarantee benefits in excess of the asset shares, then the most realistic value, though not necessarily the most conservative value, of its current with-profit liabilities is the total of the asset shares of its in-force policies. In the long run, that part of the fund which represents the asset shares will be paid out, and the only assets which are truly "free" are those in excess of the asset shares. This "additional" estate is the most natural measure of the long term asset strength of an office with the stated terminal bonus policy. We have called it an "additional" estate so that anyone who wishes to may continue to think of the margins in the valuation basis or the accrued terminal bonus as being part of *the* estate.

Since our definition relates only to the assets side of the balance sheet, it only describes part of the financial position of the fund. For example, two offices with the same *additional* estate may have different levels of guaranteed liabilities, and hence may find themselves in different financial positions.

4.5   *Factors Affecting the Additional Estate, and the "Flywheel Effect"*

It will be useful to consider how the additional estate is affected by the operations of the life office, since this point will feature in our projections. It follows from our definition that the absolute amount of the additional estate may be changed in three ways: by policies leaving the fund with claim values not equal to their asset shares; by the accumulation of interest or changes in asset values; and (though not included in the model) by the transfers of funds from other sources (for example, profits from non-profit business, to the extent that these are not used to enhance the asset shares of with-profit policies). However, we shall be more interested in the effects on the relative size of the additional estate, or in other words the A/AS ratio, since the absolute size is meaningless by itself.

First, note that if an office has always paid out exactly 100% of the asset share for each generation of policies, then its A/AS ratio will be 1. Next, note that the A/AS ratio will change only if the assets and asset shares are changing at different rates. This means, for

example, that sudden changes in asset values (such as stock market crashes) have no effect since the assets and the asset shares are both affected identically. The most important factor, from the point of view of our modelling, is the relationship between the rate of interest earned on the assets, and the rate of new business growth.

Consider an office with no additional estate, in which new business has grown at a rate g for many years, and which is otherwise in a steady state. Then at the end of every year, the total of the assets and the asset shares will both be $(1 + g)$ times their values at the beginning of the year. If we use the subscript t to denote time, then we have

$$\frac{A_t}{AS_t} = \frac{(1 + g).A_{t-1}}{(1 + g).AS_{t-1}} = \frac{A_{t-1}}{AS_{t-1}} = 1$$

This is true regardless of the rate g. However, suppose that at time $(t - 1)$ there is an additional estate; call it AE_{t-1}. Then

$$A_{t-1} = AS_{t-1} + AE_{t-1}$$

and so if the rate of return on the fund is i,

$$\frac{A_t}{AS_t} = \frac{(1 + g).AS_{t-1} + (1 + i).AE_{t-1}}{(1 + g).AS_{t-1}} = 1 + \frac{(1 + i)}{(1 + g)}.\frac{AE_{t-1}}{AS_{t-1}}$$

In other words, the additional estate, expressed as a proportion of the asset shares, changes by a factor of $(1 + i) \div (1 + g)$. So if the rate of new business growth g exceeds the rate of interest i, the additional estate will shrink in relative terms. If the rate of new business growth g is less than the rate of interest i, the additional estate will grow in relative terms.

It may be possible for an office to obtain enough working capital from the accruing terminal bonuses in the asset shares of its policies of long duration to cover the new business strains arising from its recent new business, even at relatively high rates of expansion. It may even be possible, by such means, to sustain a rate of expansion greater than the net rate of return earned on the assets. Then the rapid expansion would cause the *additional* estate to run down, in relative terms, but this would not necessarily constrain the office's trading.

These observations are based on an office in a steady state of growth at rate g, but similar effects can be seen under more realistic conditions, and this turned out to be important in our modelling. One of the factors which we examined was the rate of growth of new business in the decade before closure or demutualisation. In one case we assumed a rate of growth of new business of 25% plus inflation per year, to represent

the mortgage boom of the 1980s. Thus, by the start of the projection period, the office's new business had expanded tremendously, but most of this expansion had yet to pass through to the in-force at middle and long durations. We found that the resulting premium income caused the fund to increase at such a rate that the effect of cashflows other than premium income was muted or damped. Having taken on the "bulge" of mortgage business, the office's future was dominated by it until it was again approaching a steady state, many years later. We called this the "flywheel effect", since the mortgage business seemed to share the ability of a flywheel to keep events on a pre-determined course.

Although new business expansion may be the most obvious way in which the aggregate asset shares are changed without any change in the additional estate, changes in the patterns of exit from assurance, or in the mix of new business written, can have similar effects. For example, if more short term business were written at the expense of longer term business, then the total of the asset shares would ultimately fall, in relative terms. Increasing the lapse rates would have a similar effect.

4.6   Negative Additional Estates

One usually imagines an estate to be a positive quantity, and indeed an office with a negative estate would be in a serious position. This need not be true of an *additional* estate, however. If an office which pays out 100% of the asset share on maturity has assets which are less than the total of its asset shares, then it has a negative additional estate. There is nothing impossible about this, since the assets could still be well in excess of the valuation reserves. We will often refer to a negative additional estate by the shorter name of an "estate deficit"; when we talk of estate deficits or negative additional estates we will always mean the same thing.

An office might have an estate deficit as a result of paying out more than asset shares on claims, or because of expense over-runs which have not been reflected in the asset shares. Quite possibly these two causes might be linked, with excessive maturity payments and expenditure on distribution channels both resulting from an over-eagerness to write new business and avoid the deadly spiral of lower cost-effectiveness, lower asset shares, lower payouts and less new business. An office in that position might well have to think of some drastic remedy such as closing the fund or demutualising, and so in our modelling we paid as much attention to offices with estate deficits as to offices with healthy additional estates.

4.7   The Rôle of the Additional Estate

An office faces a conflict between security and investment freedom. The need for security may lead, through considerations of matching, to a conservative investment

strategy; indeed this may be forced upon an office by the interest rate calculation in the statutory minimum valuation basis (this will be discussed in more detail in Section 6.1.2). An additional estate may be used to allow a riskier, but potentially more rewarding, investment strategy to be followed. The need for security is still there, and if the office chooses not to match the assets to the liabilities then it must hold a mismatching reserve. The mismatching reserve may be provided by the estate (however one defines the estate) and an additional estate will then increase the scope for mismatching. An office with a large enough estate may be able to guarantee a substantial proportion of its liabilities while maintaining an unconstrained investment strategy. A mutual office without such a large estate might consider demutualising as a means of obtaining the required funds; possibly the extra investment freedom would be worth more to the with-profits policyholders than the surplus which would be given up to shareholders. We shall return to this question.

An office may find that, because of market conditions, and the level of guarantees which it has granted, it has to pay out more than the asset share on maturity from time to time. The estate (however defined) allows the office to do so, provided, in the long term, that it recoups the costs from maturing policies during more favourable times. An office might *aim* to pay out slightly less than 100% of the asset share, with the result that it pays out 100% of the asset share on average, taking the good times and the bad times together. An additional estate reinforces this ability; an important fact which will not, however, be brought out by our modelling, since we have chosen to concentrate on other aspects.

4.8 *The Vitality of a Life Office*

The additional estate is a convenient measure of the financial strength of an office. "Strength" may be taken to mean its ability to uphold its policyholders' reasonable expectations, both as regards security and value for money. The weaker an office is, the more likely it may be to consider restructuring, which is why we have given the additional estate so much weight in our modelling.

Of course, the mere fact of strength will not make an office a commercial success. Strength must be turned to advantage by effective management, and weakness may also be overcome by effective management. To represent the difference between balance sheet strength and commercial strength we have used the word "vitality". One dictionary definition of "vitality" is "the ability to sustain life" and, if the pun on the word "life" can be forgiven, this seems to be an apt way to describe the corporate well-being of a life office. In particular, it seems to describe its capacity to generate new business. Strength and vitality were the two influences which we carried throughout the modelling.

Paradoxically, weakness may follow in the wake of vitality, as rapid expansion swells

the in-force at short durations, where valuation strains might arise. Expansion may be managed carefully, by avoiding over-distribution on with-profits business or generating surplus on non-profits business, so that the estate is preserved in relative terms. However, some offices may expand too fast, and once their ingenuity with the estate is exhausted, restructuring may seem inevitable. If the office is mutual, it will be difficult to preserve mutuality.

In our modelling, we drew a distinction between offices which had expanded rapidly during the 1980s, and those which had not. We supposed that a rapidly growing office would have participated in the mortgage endowment boom, and we assumed that new business grew at 25% over the rate of inflation each year. This scenario was meant to represent an office which had been actively striving to expand its market share in recent years, had explored different distribution channels and had developed new contracts in line with the opportunities offered by regulatory, legislative or fiscal changes (although we only modelled the with-profit business). It would probably be well known to the public because of its advertising campaigns. Some of these efforts may have incurred both one-off and continuing capital costs. While such an office would obviously have been full of vitality in the past, it may not remain so in future, if it were to run out of capital or lose its distribution channels. We examined both strong and weak offices (represented by positive or negative additional estates, respectively), but the case of the weak and vital office is the more interesting, because a strong and vital office may have no reason to restructure.

We also modelled an office which had missed out on the mortgage endowment boom, and whose new business had grown at only 2% over the rate of inflation during each year of the 1980s. This scenario was meant to represent an office which had not pursued the opportunities offered by the market, and whose market share was falling. Even if it could remain cost-effective, it would be unlikely to be able to retain a strong sales force. Such an office could remain vital, perhaps by selling to niche markets, but if it was in competition with larger offices, who had become household names, it might find itself being squeezed out. (We had in mind, in constructing these scenarios, some of the changes which have taken place since the introduction of the Financial Services Act 1986.) Again we examined the possibility that this office was financially strong or weak. The former is perhaps unlikely; surely if the capital were available the office's management would use it to invigorate the organisation. However, whether or not it could be used effectively is the critical question.

The two types of office were identical apart from their new business during the 1980s. Of course, our simple model left out many factors. We only modelled life business, not pensions, and the new business profile of the expanding office was only the roughest sketch of consecutive MIRAS and LAPR booms. It is the comparison between the two offices which is useful, rather than one or the other in isolation. We hope that the insights gained through the modelling will be general enough to be more widely relevant; for

example they could describe, in essence if not in detail, a life office whose expansion had been fuelled by personal pensions business.

4.9   *The Expense Profile of a Closed Fund*

Closing a fund could be expensive. First, the marketing operations would have to be dismantled, which might entail substantial redundancy costs from laying off staff and write-off costs from abandoning the capital invested in distribution channels. There is a danger that closure is most likely to be forced upon the losers of a battle for market share, and the harder they had battled before accepting defeat, the greater would be their write-off costs.

For our modelling, the costs of closure have been taken as equal to one year's non-commission new business expenses, which are naturally linked to the level of new business being written at the time of closure. The proper figure would of course vary from case to case, but it is rather hard to ascertain with any precision and we felt that this amount was of the right order of magnitude.

Second, the office's administrative operation would gradually wind down, as would its need for premises. However, provided that the fund held a reasonable proportion of liquid assets, there seems to be no reason why the property investments held by the office should be disposed of in great haste, or for anything other than their full market value. It may well be possible to cut back the administrative workforce at almost the same rate as the in-force. Computer systems may present a difficulty, however; the proportion of renewal costs associated with systems maintenance may not fall by as much, and this is one area where overheads may be difficult to reduce.

For the model, we have made the somewhat arbitrary assumption that 90% of the costs of servicing the existing business are related to the volume of business on the books, and the remaining 10% are office-wide overhead expenses. In the closed offices, we have respread the 10% of the costs representing overheads over the gradually diminishing number of policies in-force. We were aware that this procedure is arbitrary to begin with, and becomes even more so as the run-off period nears its end; for that reason we have tested the sensitivity of the models to much more extreme assumptions (see Appendix 6).

Both the one-off expenses of closure and the increased renewal costs are reflected in the asset shares of the policies in existence at the time of closure. The extra costs are, therefore, ultimately paid for by reduced terminal bonuses.

At some point during the run-off period, it may be in the policyholders' interests to transfer the operations of the fund to another office, or to outside bureaux, for a suitable fee. Such outside bodies would hope to be able to apply economies of scale to service the remaining policies for less than the amount of the fee. We have not addressed this possibility in our modelling.

4.10   *Key Points Addressed by the Model*

The first task for the Group was to explore the consequences of an office continuing to trade as a mutual, since any restructuring would have to be measured against this course of action. However, it must be remembered that continuing to trade as a mutual may not be an option, if an office has lost its access to distribution channels. Although it may appear to be better to continue to trade as a mutual in some circumstances, that may be impossible. This might lead one to draw conclusions about the unplanned effects of investor protection legislation upon investors, but that lies outside the scope of this paper.

Given a continuing mutual office as a baseline, we tried to answer just a few key questions about closure and demutualisation. About a closed fund:

What investment freedom does a closed fund have?

and about a demutualisation:

What purchase price would be fair to existing policyholders, new policy-holders and purchasers?

Would shareholders have to inject more capital after the office is demutualised?

Would the additional investment freedom bestowed by the shareholders' capital make up for the transfers of surplus to the shareholders?

Section 5 describes the assumptions which we made about economic conditions and actuarial bases. Section 6 describes our modelling and our conclusions. In Appendix 6 we describe tests of the sensitivity of the model to some of the more important assumptions, other than strength and new business growth, namely

(a)   the general level of investment rates of return,

(b)   the gap between the rates of return on gilts and equities,

(c)   the rates of reversionary bonus,

(d)   the rate of future new business growth in an office which continues to trade as a mutual,

(e)   the expenses associated with closing an office and running off a closed fund.

5.   DESCRIPTION OF THE MODEL OFFICES

5.1   *Investment Conditions*

The starting point for setting up the model offices was the set of assumptions used by the Faculty of Actuaries Mortality Research Group in their investigations of the effect

of AIDS (reference 18). The start of our projection period was taken as 1990, and the offices' funds were built up to that time assuming financial conditions similar to those prevailing from 1949 until the end of 1988, thereafter moving to stable conditions by the end of 1990.

The investment conditions applying to each calendar year from 1949 to 1987 were derived from the Barclays de Zoete Wedd indices of Retail Prices, Equity Prices, Equity Income Yields and Gilt Yields, and these are shown in Appendix 1. We used the yearly values with no smoothing. The Gilt Yields, although representative of the yields on long term gilts, were applied to dated stocks of all terms, to give a flat yield curve. The coupon on all gilts was assumed to be 9%.

The following values were used for 1988, 1989 and 1990 and later.

	1988	*1989*	*1990 and later*
Rate of Retail Price Inflation	6.8%	8.0%	6.0%
Gross Dividend Yield	4.8%	4.8%	4.5%
Rate of increase in Equity prices	7.6%	20.0%	6.0%
Gross redemption yield on gilts	9.3%	9.2%	9.0%

The model assumes that all cashflows, including income from assets, take place at the end of the year. The dividend yield therefore represents the dividend paid at the end of the year divided by the share price at the start of the year; the rate of increase in equity prices is based on the share price at the end of the year divided by the share price at the start of the year, and the gilt yield is calculated assuming that the coupon is payable at the end of the year.

5.2 Investment Strategies

The offices used a simple investment strategy before 1990. We assumed that the fund was invested 50% in gilts and 50% in equities at the outset in 1949. The proportion invested in equities was then increased in steps of 10% every 10 years, finally reaching 80% in 1979. The asset backing of the individual policies, or in other words, the investments backing the asset shares, followed the same strategy. The gilt component of the asset share of each policy was invested in gilts of the same outstanding term as that policy.

After 1990, the offices moved to a dynamic investment strategy, so that the proportion of the fund invested in gilts reflected the office's strength on the statutory minimum valuation basis. This strategy is described in more detail in Section 6.1.2.

5.3   *Tax*

Rates of tax and tax relief were as follows:

Period	Corporation Tax	Income Tax	Tax Relief
1949-72	37.5%	37.5%	37.5%
1973	37.5%	30%	37.5%
1974	37.5%	33%	37.5%
1975-76	37.5%	35%	37.5%
1977	37.5%	34%	37.5%
1978	37.5%	33%	37.5%
1979-85	37.5%	30%	37.5%
1986	35%	29%	35%
1987	35%	27%	35%
1988	35%	25%	35%
1989-	25%	25%	25%

5.4   *Reversionary Bonus*

The compound reversionary bonus rates in respect of premiums paid during each year before 1990 followed a pattern of steady increase until the late 1970s, when a move was made to a two-tier or supercompound bonus system increasingly skewed towards bonus on bonus, which was then followed by reductions in bonus rates.

Years	Rate of Reversionary Bonus on Sum Assured	on Bonus
1949-58	2.5%	2.5%
1959-68	3.5%	3.5%
1969-78	4.5%	4.5%
1979-84	4.0%	5.0%
1985-88	3.0%	6.0%
1989-93	2.5%	5.0%
1994-	2.0%	4.0%

We assumed that the office had, by 1990, come to rely on accruing terminal bonuses to supply it with working capital. The investment conditions after 1990 would then

probably lead to a further reduction in bonus, such as our assumed cut in 1994 to 2.0% of the sum assured and 4.0% of the attaching bonus.

5.5 *Terminal Bonus*

Terminal bonus on deaths and maturities was assumed to be paid throughout the period, based on 100% of the asset shares for deaths and maturities.

5.6 *Lapses and Surrender Values*

Lapse rates were assumed to be 4% in the first policy year, 3% in the second policy year and 2% in each subsequent policy year. Surrender values were payable after the second policy year. The minimum surrender value was calculated as a net premium reserve, using A1967-70 ultimate mortality and an interest rate of 5%, with a Zillmer factor of 3.5%. The surrender value actually paid could be higher than this because of terminal bonus, which was calculated so that surrender values were not less than the following proportions of the asset share:

Policy Year	Minimum Proportion of Asset Share
3—5	60%
6—20	95%
21	96%
22	97%
23	98%
24	99%

The net effect overall is that surrenders provide a small profit to the office.

5.7 *Published Valuation Basis*

The valuation basis used for the published Returns was assumed to be a 3% unzillmerised net premium basis, with net premiums restricted to 90% of office premiums. The valuation reserve included a solvency margin of 4% of the reserve plus 0.3% of the sum at risk. This basis was used for one purpose only; to calculate the cost of reversionary bonuses in order to determine the transfers to shareholders in a demutualised office.

The amounts transferred to shareholders in respect of reversionary bonus declarations were also influenced by two simplifications imposed by the model. First, the transfer in any year was based upon the cost of bonus in the previous year. Second, the transfer in

any year was based on the cost of bonus including the cost of the increase in the solvency margin. The effects of these two factors are small and in opposite directions.

5.8   *Statutory Minimum Valuation Basis*

For all purposes except calculating shareholders' surplus, we used a valuation basis close to the statutory minimum valuation basis. That is, we used a zillmerised net premium basis, with A1967-70 ultimate mortality and a variable rate of interest. The rate of interest was a weighted mean of 92.5% of the net dividend yield on equities (excluding capital appreciation) achieved during the preceding year, and 92.5% of the net redemption yields on gilts on the valuation date. These yields were weighted by the market values of equities and gilts, respectively, held by the fund at the end of the year, after any reinvestment or investment of new money had taken place.

The valuation rate of interest was restricted to not more than 5% (net) on money invested more than three years after the valuation date. Although there is not, as yet, any universally acceptable way of calculating reserves subject to this restriction, we chose to use the "W2" method as described by Elliot (reference 19).

The Zillmer factor was 3.5%, which is approximately the maximum which would be allowed by the regulations for this type of business. Net premiums were limited to 90% of office premiums, and negative values were excluded. A solvency margin of 4% of the reserve and 0.3% of the sums at risk was included.

5.9   *Mismatching Reserves*

A mismatching test along the lines of the working rule used by G.A.D was assumed. The mismatching reserve consists of the assets needed, over and above the amount of the current statutory minimum reserves and E.C. solvency margins, to set up the statutory minimum reserves and E.C. solvency margins should the price of equities fall by 25% and the gross redemption yields on gilts change by ±3%.

5.10   *Type of Business, Premium Rates and Policy Charges*

The model offices wrote with-profits 25-year endowment assurances on males aged 30 at entry. The premium rate was £40.20 per mille. There was an annual policy charge, linked to inflation for new business (but fixed for in-force business) and calculated so as to be equal to £10 in 1984.

5.11   *Expenses (Except in Closed Funds)*

Commission was based on LOA (non-indemnity) scales during 1949-88, and LAUTRO (non-indemnity) scales from 1989 onwards. Other initial expenses were 50% of the initial commission, and a per-policy expense, linked to inflation, calculated so as

to be equal to £40 in 1984. The other renewal expense was a per-policy expense, also linked to inflation and calculated so as to be equal to £10 in 1984. These gross expenses were netted at the rates given in 5.3 above.

The expense profile of a closed fund was discussed in more detail in Section 4.9.

5.12　*New Business Growth*

The rate of new business growth in the years before 1990 was so important that we ran two different sets of model office projections.

In the first set, new business growth was 2% above the rate of inflation except during the period 1979-1989, when it was 25% above the rate of inflation. As mentioned in Section 4.8, this represented an office which had participated in the mortgage endowment boom of the 1980s. We gave the following names to this model, depending on what happened after 1990:

Course followed after 1990	*Name*
Continued to trade as a mutual	MUT-25
Closed to new business	CL-25
Demutualised, with-profit fund open to new business	PROP-25
Demutualised, with-profit fund closed to new business	PCL-25

In the second set, new business growth was always 2% above the rate of inflation, including the years 1979-1989. This represented an office whose market share was falling. We gave the following names to this model, depending on what happened after 1990:

Course followed after 1990	*Name*
Continued to trade as a mutual	MUT-2
Closed to new business	CL-2
Demutualised, with-profit fund open to new business	PROP-2
Demutualised, with-profit fund closed to new business	PCL-2

In all cases the average premium per policy was assumed to increase in line with the RPI. The excess of the rates of new business growth over the rate of inflation therefore represents the real growth in the office's business, although not necessarily in its market share.

6. MODELLING THE RESTRUCTURING OF A MUTUAL OFFICE

6.1   *Three Measures of Financial Performance*

Before one can compare one life office with another, it is necessary to seek one or more yardsticks of financial performance. The Group chose three such measures:

(a)   The ratio of assets to liabilities ("The A/L Ratio").

(b)   The proportion invested in equities.

(c)   The relative maturity values payable.

6.1.1   *The A/L Ratio*

Technical solvency depends on assets being not less than technical reserves; it is therefore natural to examine the ratio of assets to liabilities. However, the precise choice of which assets, and which liabilities, is not so simple.

"Assets" could mean market values of all assets, or of a restricted set of assets (for example if not all of the assets were admissible). Alternatively, it could mean an actuarial value obtained by discounting estimated income streams. The Group chose to assume that its offices held only admissible assets, and we took "assets" to mean the market value of all the assets held by the office. This is at least consistent with the valuation of assets Regulations.

For "liabilities" the choice lies between the actuary's published basis and the statutory minimum basis. The statutory minimum valuation is probably the one which matters more in a study such as this, where we are looking for how close an office is to statutory insolvency. Another question is whether to include or exclude any solvency margins and a mismatching reserve. The actuary must look at the mismatching position, in prudence and in view of Regulation 55, and perhaps all the more carefully in a closed fund. We decided that, in view of the questions which we were addressing, it would be more realistic to include mismatching reserves, and we adopted the G.A.D. "working rule" (see Section 5.9). The Group's definition of "liabilities" is therefore the statutory minimum reserve plus the statutory solvency margin plus any mismatching reserve calculated using the G.A.D. working rule.

6.1.2   *Proportion Invested in Equities*

The Group based its projections on management strategies which, broadly speaking, would be familiar to a modern actuary. While one could argue that a projection ought to allow for the evolution of management strategies in line with events as they take place, this can be very difficult indeed to model.

The most obvious example of such a "familiar" strategy follows from the assumption that real growth in a savings policy will follow from equity investment. The managers of our model offices tried to maximise the proportion of the fund invested in equities, subject to some restriction based on risk.

The idea of "risk" is rather slippery; given a stochastic asset model one might define risk in terms of the tails of the distributions of the rates of return, but with a deterministic asset model one must fall back on the margin between assets and liabilities as a surrogate. This is less satisfactory in theory, since the risk of insolvency on the statutory valuation basis may not be the same as the risk of insolvency on an emerging cost basis, but the inclusion of a mismatching reserve in the liabilities makes this measure of risk a great deal more robust, and the fact that the Authorities will look to the statutory valuation basis to test solvency cannot be ignored. In fact the Group chose to use the A/L ratio as defined above in its definition of acceptable risk.

The investment strategy we used was an active one. An important feature of the current valuation Regulations is that the valuation interest rate is based on the redemption yield for fixed interest stocks but only the dividend yield on equities; capital appreciation is not taken into account. Consequently, an office which invests largely in equities is forced to use a lower valuation interest rate than an office which invests largely in gilts. Similarly, an office which invests largely in equities and whose financial strength (as revealed by the statutory minimum valuation) is weakening, can improve its position simply by switching part of the fund from equities to gilts. To be realistic, a model office must be able to change the investment strategy in response to changes in financial strength on the statutory minimum basis. The strategy we used was to maximise the proportion of the fund invested in equities, subject to the A/L ratio (as defined above) not falling below a "danger" level of 1.15. If the A/L ratio fell to this "danger" level, the proportion invested in equities would be reduced, and the valuation interest rate would therefore increase, to the point where the A/L ratio was equal to 1.15. The danger level of 1.15 was chosen as a rule of thumb, on the grounds that the mismatching test used only allowed for a 25% fall in equity prices, which is by no means extreme, and that some further mismatching test might have to be satisfied even immediately after a fall in equity prices.

6.1.3 *Relative Maturity Values*

The proportion invested in equities acts as a day-to-day measure of the office's ability to pursue a free investment policy. The ultimate measure of success, however, is the maturity value paid to the policyholder. The Group assumed that the offices paid maturity values equal to the accrued asset shares. The maturity values, compared with the maturity values in some neutral "baseline" office, show how the changes in investment strategy which might be forced on an office through the mechanism described above would affect the policyholders. Note that the neutral "baseline" office

is chosen to be appropriate in the particular circumstances of each part of our investigation, and the relative maturity values in different tables cannot usually be compared with each other.

Another measure, which we did not use, might have been the proportion of the policyholders' benefits which are in guaranteed form as sum assured or reversionary bonus. The reassurance given by these guarantees could be worth a great deal to policyholders after a change in their office's management and objectives.

6.2   *Continuing Mutual Office—Baseline*

This section describes the financial consequences of our model offices continuing to trade as mutuals. We do not mean to suggest that these offices would necessarily be able to do so regardless of the commercial circumstances (for example, in the absence of distribution channels) , but it is useful to have a baseline which represents, as nearly as possible, the maintenance of the status quo.

As described in Section 5.12, the office called MUT-25 represents an office which has just participated in a boom in the endowment market, and has expanded its new business at a real rate of 25% per year for the last 10 years, while the office called MUT-2 represents a more pedestrian office whose new business has expanded at only 2% over RPI per year for many years in the past. We maintain these separate cases throughout this paper, as they will be found to behave in different ways and lead to different conclusions.

In this section only, we will show the effect of a wide range of additional estates at 1990. The "additional estate" was defined in Section 4.4 as the assets in excess of the total of the asset shares of the in-force business. It is measured by the ratio of assets to asset shares (or the "A/AS ratio"). The model office has been arranged to have no additional estate in 1989, and thereafter it builds up a very small estate from profits on surrenders. The additional estate at 1990 is simulated in the model by a transfer of assets made at time 1990, expressed as a percentage of the total asset shares of the office. The column headings in most of the tables which follow refer to these additional estates. Note that this definition does not depend on the valuation basis in any way. On the assumption that all claim values are equal to the asset share at the time of a claim, the additional estate represents those assets which will not ultimately be paid out in the form of benefits. Our tables include substantial estate deficits as well as positive additional estates. As mentioned in Section 4.6, it is quite possible for an office which has paid claim values in excess of asset shares, perhaps as a result of having suffered expense over-runs, to have an estate deficit. Provided the total of the asset shares is sufficiently in excess of the total reserves, it would be virtually impossible to detect the true position from the information published in the D.T.I. Returns. The Group therefore felt it could not rule out offices with estate deficits.

In subsequent sections we will consider a more restricted range of additional estates, namely –20%, 0% and +20% of the total asset shares of the office at the relevant date (usually the date of closure or of demutualisation).

Tables 1 and 2 show the proportion of the fund invested in equities under the assumptions for future rates of return, rates of bonus and rates of new business growth described in Section 5.

Table 1

Office MUT-25
Percentage in Equities

| | <——————Additional Estate (% of Asset shares) at 1990——————> | | | | | | | |
Time	*–40%*	*–30%*	*–20%*	*–10%*	*0%*	*+10%*	*+20%*	*+30%*	*+40%*
1991	28·4	57·5	79·9	97·6	100·0	100·0	100·0	100·0	100·0
1993	21·7	47·4	68·0	84·7	98·1	100·0	100·0	100·0	100·0
1995	22·1	43·6	61·6	76·8	89·2	99·4	100·0	100·0	100·0
1997	27·6	45·4	60·8	74·1	85·3	94·8	100·0	100·0	100·0
1999	32·8	47·7	61·0	72·8	83·0	91·7	98·9	100·0	100·0
2001	35·2	48·7	61·2	72·7	82·2	90·3	97·1	100·0	100·0
2003	37·6	50·0	61·6	72·6	82·3	89·8	96·4	100·0	100·0
2005	39·7	51·4	62·6	73·2	82·6	90·0	96·6	100·0	100·0
2007	41·6	52·8	63·7	74·1	83·4	90·8	97·5	100·0	100·0
2009	43·5	54·4	65·1	75·5	84·5	92·2	99·0	100·0	100·0
2011	45·4	56·1	66·8	77·2	86·1	93·9	100·0	100·0	100·0
2013	47·4	57·9	68·6	79·0	87·9	95·8	100·0	100·0	100·0
2015	49·8	60·0	70·5	80·8	89·7	97·7	100·0	100·0	100·0

These tables show the effect of the active investment strategy used in the model. The same reversionary bonus rates were used for all the projections; clearly this would not be practical in Office MUT-2 with an estate deficit of 20% or more, but it allowed direct comparisons to be made. With large enough additional estates, the assets are sufficient to keep the A/L ratio above 1.15 even where the liabilities are valued on a low rate of interest. The assets can therefore be invested 100% in equities at all times. On the other hand, a lower additional estate means that the liabilities have to be valued at a higher rate of interest in order to keep the A/L ratio as high as 1.15, and this can only be done by switching part of the fund into gilts. An interesting question then arises: what determines whether the office is forced to switch more towards gilts as time passes (as in, for example, Table 2 with a –10% additional estate), or whether it can gradually return to higher levels of equity investment (as in, for example, Table 1 with no additional estate)?

   The two offices differ in more than just size. Office MUT-2 is extremely sensitive to the level of the additional estate within a quite narrow band (about –20% to +10%). Below this band, the office quickly becomes insolvent, and above this band no amount of additional estate has any effect, since it is nearly in a position to support 100% equity investment (by the criterion used) with no additional estate at all. Office MUT-25 is much less sensitive to the relative size of the additional estate than is Office MUT-2. It is not made insolvent even by an estate deficit of 40%, and it does not support 100% investment in equities until the additional estate exceeds 20%. It appears that the bulge of mortgage business acts as a flywheel, as described in Section 4.5, and the natural rate of increase of the fund negates the effect of the additional estate, whether it is positive or negative.

Table 2

Office MUT-2
Percentage in Equities

| | <———————Additional Estate (% of Asset shares) at 1990———————> | | | | | | | |
Time	*–40%*	*–30%*	*–20%*	*–10%*	*0%*	*+10%*	*+20%*	*+30%*	*+40%*
1991	26·4	65·6	93·7	100·0	100·0	100·0	100·0	100·0	100·0
1993	0·0	44·0	80·6	100·0	100·0	100·0	100·0	100·0	100·0
1995	0·0	21·6	66·4	96·4	100·0	100·0	100·0	100·0	100·0
1997	*	2·1	52·3	89·3	100·0	100·0	100·0	100·0	100·0
1999	*	0·0	34·9	80·3	100·0	100·0	100·0	100·0	100·0
2001	*	*	16·8	70·6	100·0	100·0	100·0	100·0	100·0
2003	*	*	0·0	61·5	99·1	100·0	100·0	100·0	100·0
2005	*	*	0·0	53·3	96·8	100·0	100·0	100·0	100·0
2007	*	*	0·0	46·6	95·5	100·0	100·0	100·0	100·0
2009	*	*	0·0	42·4	95·7	100·0	100·0	100·0	100·0
2011	*	*	0·0	39·5	96·4	100·0	100·0	100·0	100·0
2013	*	*	0·0	37·6	97·5	100·0	100·0	100·0	100·0
2015	*	*	0·0	36·4	98·7	100·0	100·0	100·0	100·0

   * *Denotes an office which has an A/L ratio of less than 1.0. Note that the A/L*
      ratio includes a mismatching reserve.

   The A/L ratio can be considered as being the product of two other ratios, namely the A/AS ratio and the ratio of the asset shares to the liabilities (or the AS/L ratio). The advantage of this representation is that it shows the contributions of the additional estate and of the in-force business to the working capital of the office. Table 3 shows these three ratios, for both offices with a +30% additional estate (chosen so that there should be no investment constraints on either office).

Table 3

Additional Estate of +30% at 1990

| Year | <——— MUT-25 ———> | | | <——— MUT-2 ———> | | |
	A/AS	AS/L	A/L	A/AS	AS/L	A/L
1991	1·282	1·244	1·595	1·308	1·391	1·820
1993	1·242	1·129	1·402	1·324	1·313	1·738
1995	1·204	1·067	1·285	1·338	1·257	1·682
1997	1·174	1·045	1·227	1·354	1·216	1·647
1999	1·151	1·034	1·190	1·371	1·175	1·611
2001	1·133	1·034	1·171	1·391	1·145	1·592
2003	1·119	1·039	1·163	1·414	1·122	1·586
2005	1·109	1·050	1·164	1·437	1·106	1·590
2007	1·102	1·061	1·169	1·465	1·096	1·606
2009	1·097	1·074	1·178	1·488	1·095	1·630
2011	1·095	1·085	1·188	1·507	1·097	1·653
2013	1·094	1·095	1·198	1·523	1·099	1·674
2015	1·096	1·103	1·209	1·538	1·103	1·696

In both offices, the A/L ratio falls and then rises again. In neither case does it fall to the "danger level" of 1.15, so the liabilities are being calculated on the same basis in each year. The reasons for the fall and rise, however, are slightly different in each case.

(a) It is a period of transition from high investment returns before 1991 to lower investment returns. A large part of the working capital is provided by the accrued terminal bonuses of the in-force business. In both offices, those policies which have been in force longest, and which have very high asset shares because they participated in the bull market in the years before 1991, are gradually maturing and being replaced by policies with relatively lower asset shares. This is responsible for the decline in the AS/L ratios.

(b) On examining the asset shares and liabilities of policies of different durations in force, it turns out that the margin between the asset share and the value of the liability (which is zillmerised) is nearly always positive, and it is smallest at policy durations 7 and 8 years. The office MUT-25 is in the middle of a period of transition, into being a very much bigger office than it was at the start of the 1980s. Its in-force business in the years after 1991 is heavily weighted by policies of just those terms with the lowest AS/L ratios; hence its overall AS/L ratio starts at a lower level and declines more rapidly than that of office MUT-2.

(c) The total asset shares in Office MUT-25 are increasing rapidly just after 1991, not because of investment earnings but because of the premium income from the bulge of mortgage business written before 1991. In fact, the asset shares increase

at a rate considerably in excess of the rate of return on the assets. However, the assets representing the additional estate can only increase at the rate of return earned on the assets, so the A/AS ratio also falls quite steeply in the years after 1991. Combined with the fall in the AS/L ratio, this produces the precipitous decline in the A/L ratio. The decline is halted and then (just) reversed as the office matures into a stable state, with new business growth slightly below the rate of return on the assets.

(d) In office MUT-2, the steady expansion of new business in the past means that the asset shares settle down after 1991 to a steady, moderate growth, which happens to be slightly below the rate of return earned on the assets. The A/AS ratio therefore increases at a moderate rate. This, combined with the effect described in (a), produces a gentle fall and rise in the A/L ratio.

To sum up, a 30% additional estate at 1990 is worth less in relative terms to MUT-25 than to MUT-2 because it is measured with respect to the asset shares before most of the cashflows from the in-force business have been accumulated; the asset shares of office MUT-25 are just about to mushroom, while those of office MUT-2 are not. In other words, MUT-25 is less sensitive to the presence or magnitude of an additional estate at 1990 than MUT-2 is.

Note (looking ahead a little) that Tables 6 and 7 show the A/L ratios corresponding to Tables 1 and 2. It will be seen that, for an office with a substantial additional estate, the A/L ratio falls and then rises as described above. For rather lower levels of additional estate (for example, MUT-25 with no additional estate), the same pattern would exist but for the active investment strategy, which pegs the A/L ratio at 1.15. It can be seen in Tables 1 and 2, however, that the proportion of the fund invested in equities falls and then rises, so the same causes are at work. For large negative estates (for example, MUT-2 with a −30% additional estate) insolvency intervenes.

Table 4

Office MUT-25
Maturity Value as % of MUT-25 with no additional estate

<────────Additional Estate (% of Asset shares) at 1990────────>

Time	−40%	−30%	−20%	−10%	0%	+10%	+20%	+30%	+40%
1991	98·5	99·2	99·8	100·0	100·0	100·0	100·0	100·0	100·0
1995	92·1	95·0	97·3	99·1	100·0	100·2	100·2	100·2	100·2
1999	87·4	91·6	95·1	98·0	100·0	101·1	101·5	101·5	101·5
2003	84·4	89·2	93·5	97·2	100·0	101·9	102·9	103·2	103·2
2007	82·6	87·7	92·4	96·6	100·0	102·4	104·1	104·6	104·6
2011	82·2	87·1	91·8	96·3	100·0	102·9	105·0	105·7	105·7
2015	83·0	87·5	91·9	96·2	100·0	103·1	105·5	106·1	106·1

Table 5

Office MUT-2

Maturity Value as % of MUT-2 with no additional estate

	<———————Additional Estate (% of Asset shares) at 1990————————>							
Time	*–40%*	*–30%*	*–20%*	*–10%*	*0%*	*+10%*	*+20%*	*+30%*	*+40%*
1991	98·7	99·5	100·0	100·0	100·0	100·0	100·0	100·0	100·0
1995	90·8	94·9	98·4	100·0	100·0	100·0	100·0	100·0	100·0
1999	82·9	87·1	94·4	99·1	100·0	100·0	100·0	100·0	100·0
2003	76·3	79·8	87·8	96·6	100·0	100·0	100·0	100·0	100·0
2007	71·6	74·3	81·1	93·1	100·0	100·2	100·2	100·2	100·2
2011	68·8	70·6	75·5	89·1	100·0	100·6	100·6	100·6	100·6
2015	67·8	68·6	71·7	85·3	100·0	100·9	100·9	100·9	100·9

Tables 4 and 5 show the maturity values in an office with an additional estate, expressed as a percentage of those in the office with no additional estate.

Office MUT-25 is more sensitive to the presence of an additional estate, whereas an additional estate has little effect on Office MUT-2 because the latter has almost complete investment freedom without an additional estate. On the other hand, Office MUT-2 is much more sensitive to an estate deficit than is Office MUT-25.

Under the investment conditions which we have assumed, the effect on policyholders of restricted investment freedom can be substantial. It is notable that the penalties imposed by a negative additional estate are relatively greater than the advantages bestowed by a positive additional estate. This fact depends on the circumstances of the model, in particular its past history of bonuses and investments, and might not be a general feature. It might also be expected that these results would be sensitive to the assumed gap between the net returns on gilts and the net returns on equities, which in these projections were 6.75% and 9.375% respectively; we will examine this later. Note that, as a consequence of our deterministic assumptions, it is never necessary to pay out more than the asset share of a policy in order to meet the guarantees given.

Tables 6 and 7 show the A/L ratios, which as expected are often equal to 1.15 because of the asset allocation algorithm.

It is quite remarkable that office MUT-25 can suffer an estate deficit of 40% at 1990 and still reach an A/L ratio of 1·15 just by adjusting its investments. This deficit is a real hole in the asset shares, yet it could only be detected indirectly by an outside observer who had to rely on published data (for example, if the investment policy appeared to be unusual). In passing, it may be mentioned that in office MUT-25 with a 40% estate deficit, the A/L ratio on the statutory minimum valuation basis *excluding* the mismatching reserve never fell below 1·20, and the estate deficit fell from 40% to 5·5% by the year 2015. There is food for thought in these figures.

Table 6

Office MUT-25
A/L Ratio (Statutory inc. Mismatch)

<———————Additional Estate (% of Asset shares) at 1990————————>

Time	−40%	−30%	−20%	−10%	0%	+10%	+20%	+30%	+40%,
1991	1·150	1·150	1·150	1·150	1·248	1·363	1·479	1·595	1·710
1993	1·150	1·150	1·150	1·150	1·150	1·225	1·314	1·402	1·491
1995	1·150	1·150	1·150	1·150	1·150	1·150	1·215	1·285	1·355
1997	1·150	1·150	1·150	1·150	1·150	1·150	1·170	1·227	1·284
1999	1·150	1·150	1·150	1·150	1·150	1·150	1·150	1·190	1·238
2001	1·150	1·150	1·150	1·150	1·150	1·150	1·150	1·171	1·212
2003	1·150	1·150	1·150	1·150	1·150	1·150	1·150	1·163	1·200
2005	1·150	1·150	1·150	1·150	1·150	1·150	1·150	1·164	1·197
2007	1·150	1·150	1·150	1·150	1·150	1·150	1·150	1·169	1·200
2009	1·150	1·150	1·150	1·150	1·150	1·150	1·150	1·178	1·206
2011	1·150	1·150	1·150	1·150	1·150	1·150	1·156	1·188	1·215
2013	1·150	1·150	1·150	1·150	1·150	1·150	1·168	1·198	1·225
2015	1·150	1·150	1·150	1·150	1·150	1·150	1·178	1·209	1·236

Table 7

Office MUT-2
A/L Ratio (Statutory inc. Mismatch)

<———————Additional Estate (% of Asset shares) at 1990————————>

Time	−40%	−30%	−20%	−10%	0%	+10%	+20%	+30%	+40%,
1991	1·150	1·150	1·150	1·252	1·394	1·536	1·678	1·820	1·962
1993	1·128	1·150	1·150	1·180	1·320	1·459	1·599	1·738	1·878
1995	1·012	1·150	1·150	1·150	1·266	1·405	1·543	1·682	1·820
1997	·926	1·144	1·150	1·150	1·230	1·369	1·508	1·647	1·786
1999	·850	1·047	1·150	1·150	1·192	1·332	1·472	1·611	1·751
2001	·794	·974	1·150	1·150	1·164	1·306	1·449	1·592	1·734
2003	·754	·922	1·147	1·150	1·150	1·292	1·439	1·586	1·733
2005	·730	·888	1·091	1·150	1·150	1·285	1·438	1·590	1·743
2007	·718	·869	1·055	1·150	1·150	1·287	1·447	1·606	1·766
2009	·722	·867	1·039	1·150	1·150	1·297	1·463	1·630	1·796
2011	·735	·875	1·034	1·150	1·150	1·308	1·480	1·653	1·825
2013	·754	·888	1·035	1·150	1·150	1·320	1·497	1·674	1·852
2015	·774	·904	1·041	1·150	1·150	1·331	1·514	1·696	1·878

As mentioned before, we will from now on consider a more restricted range of additional estates at 1990, namely –20%, 0% and +20% of the total asset shares of the office at the relevant date (usually the date of closure or of demutualisation).

6.3   Closing the Fund

In Section 2 it was pointed out that an office might consider closure as an alternative to continuing to trade either as a mutual or as a proprietary company. It would try to determine if closure offered any clear advantages to the policyholders, in terms of higher maturity values or greater security. Several factors would need to be considered.

6.3.1   Expenses

The nature and amount of the expenses which might follow closure were discussed in Section 4.9. In this section we confine ourselves to the assumptions stated there, although noting that expenses are the subject of sensitivity tests in Appendix 6.

6.3.2   New Business Strain

New business strain would disappear rapidly after closure, which would provide the greatest relief to an expanding office. An example might be an office with healthy distribution channels running out of capital. The management of such a clearly viable office would probably find demutualisation more attractive than closure from a commercial point of view, but they may think it necessary to look at other strategies from the policyholders' points of view; this was discussed in Section 2.

6.3.3   The Additional Estate

At the time of closure, an office might have a positive additional estate, and the question of what to do with it must be faced. If it is not distributed at all, then the policyholders' security is enhanced, but the residual assets will be left ownerless after the run-off. If it is distributed, then a method has to be found which is equitable between one generation of policyholders and another, and as the additional estate runs down it will contribute less to the security of the office. It may be, however, that the office enjoys reasonable security anyway during the run-off period, for the reasons discussed in Section 6.3.4 below.

A negative estate poses a more imperative problem; the office cannot continue to pay out full asset shares during the run-off period, and it would be necessary to reduce terminal bonuses from this level.

The Group assumed that an office would attempt to run down a positive additional estate or recover a negative one. A method which seemed reasonably equitable was to pay maturity values of $X\%$ of the asset share throughout the run-off period, where $X\%$ exceeds 100% in the case of a positive additional estate, and $X\%$ is less than 100% in the case of a negative estate. The values of X used in the projections which follow were approximate and after some experiment were taken to be those shown in Table 8:

Table 8

Proportions of Asset Shares Paid during Run-off

Office	Additional Estate	Proportion of Asset Share paid on	
		Maturities	Surrenders
CL-25	–20%	90%	85%
CL-25	0%	100%	95%
CL-25	+20%	113%	108%
CL-2	–20%	85%	80%
CL-2	0%	100%	95%
CL-2	+20%	115%	110%

These values were found to leave a residue of assets after the run-off, small in relation to the last few years' maturity payments. In the case of projections with no additional estate, this residue represented the lapse profits made during the run-off period. Since the values which would leave no residual assets would change slightly if other assumptions were changed, and since in practice no office could implement such a strategy other than very roughly, we felt that greater accuracy was not justified.

6.3.4 *Investment Freedom and Security*

One of the features of with-profits business is that an office has the ability to pool one generation of policyholders with another, and smooth out the excesses of the experience. A closed office will gradually lose that useful ability and, as it runs down, the policyholders will increasingly be faced with the consequences of their own experience, whether good or bad. The investment guarantees will loom larger, and it might be expected that a closed fund would have to move its assets into gilts as time passed.

On the other hand, the value of the liabilities when expressed as a proportion of the asset shares may well fall, as the office runs down, and this might allow the office to maintain its investment freedom. First, note that the removal of new business strain imparts an immediate boost to the free assets (meaning the excess of the assets over the value of the liabilities). Second, the office could aim for a high terminal bonus content in its maturity values, implying that the free assets represented by accrued terminal bonus would grow, relative to the liabilities, as the business ran down. A closed office has fewer constraints on its reversionary bonus declarations than an office which continues to trade, and some level of bonus cuts might be held to increase rather than to decrease the reasonable expectations of policyholders, although policyholders would not necessarily see it in this light, and might prefer to receive a smaller ultimate benefit with greater certainty.

It should be noted that the results shown for the closed funds can be extremely volatile in the last few years of the run-off period. The effects of past actions are magnified greatly when there are only one or two generations of policies left; thus any residue of the estate left undistributed by the end may be small in amount and yet may be a very large proportion of the funds remaining. An example of this can be seen in the results in Table 9 for Office CL-2 with a 20% estate deficit.

The remainder of this section, and Section 6.4, attempt to answer the following question.

What investment freedom does a closed fund have?

Table 9 shows the proportions invested in equities during the run-off period, for offices which close to new business at the end of 1990.

	Office CL-25			Office CL-2		
Year	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
1991	73·9%	100·0%	100·0%	94·5%	100·0%	100·0%
1993	63·2%	96·7%	100·0%	86·6%	100·0%	100·0%
1995	56·2%	92·5%	100·0%	80·5%	100·0%	100·0%
1997	51·5%	91·0%	100·0%	74·7%	100·0%	100·0%
1999	45·8%	90·0%	100·0%	65·7%	100·0%	100·0%
2001	39·8%	90·6%	100·0%	55·8%	100·0%	100·0%
2003	33·0%	93·0%	100·0%	45·0%	100·0%	100·0%
2005	24·3%	97·8%	100·0%	32·0%	100·0%	100·0%
2007	11·7%	100·0%	100·0%	18·8%	100·0%	100·0%
2009	0·0%	100·0%	100·0%	8·5%	100·0%	100·0%
2011	0·0%	100·0%	100·0%	3·6%	100·0%	100·0%
2013	0·0%	100·0%	100·0%	39·4%	100·0%	100·0%

Table 9

Offices CL-25 and CL-2
Percentage in Equities

Comparison with Tables 1 and 2 is interesting. The only case in which the closed office has less investment freedom, in the longer term, than the corresponding continuing mutual office is office MUT-25/CL-25 with an additional estate of −20%. This is because the deficit in the estate is uncovered when the business is run off, instead of being hidden by the future expansion. It is arguable that the continuing mutual office should reduce its terminal bonuses in order to recover the deficit in the estate, which

would perhaps make the results more consistent. Office CL-2, even with a –20% additional estate, seems to have more investment freedom than MUT-2.

Table 10 shows the maturity values paid in the closed office, as a percentage of the maturity values paid in the corresponding continuing mutual office with no additional estate. These figures are directly comparable with those in Tables 4 and 5, but note that the figures for Office CL-25 are *not* comparable with those for Office CL-2.

Table 10					
Maturity Values as percentage of those in					
continuing mutual offices with no additional estate					
	Office CL-25			Office CL-2		
	–20% Add'l Estate	*0% Add'l Estate*	*+20% Add'l Estate*	*–20% Add'l Estate*	*0% Add'l Estate*	*+20% Add'l Estate*
Year						
1991	89·4%	99·6%	112·5%	84·9%	99·8%	114·7%
1995	86·9%	99·5%	112·4%	84·2%	99·8%	114·4%
1999	84·3%	100·0%	113·7%	82·5%	99·8%	114·1%
2003	81·4%	100·7%	115·4%	79·4%	99·8%	114·0%
2007	77·8%	101·9%	117·0%	75·1%	99·9%	114·3%
2011	73·3%	102·9%	117·9%	70·1%	100·2%	114·6%
2015	70·1%	104·4%	119·1%	68·0%	100·6%	115·0%

Again, we must emphasise that these results depend crucially on the gap between the rate of return on gilts and the rate of return on equities, which is a matter of assumption. The general question of the sensitivity of maturity values to this assumption is examined in Appendix 6.

We observe, from the offices with no additional estate, that the effect of the additional expenses is very small; since they are deducted from the asset shares they cause a slight fall in maturity values immediately after closure, but the ability of the office to pursue a slightly less restricted investment strategy results in a higher rate of return on the asset shares which gradually compensates for the expenses.

The most obvious feature is the extent to which policyholders benefit if there is an additional estate to distribute. The gradual distribution of the additional estate through terminal bonus does not appear to have impaired investment freedom, in that there has been no need to invest towards gilts to meet our solvency criterion. The robustness of this feature in the face of falls in share prices is tested in Section 6.4, and we shall defer drawing any conclusions until then.

Table 11 shows the A/L ratios of the closed offices, which again are often constrained to be 1.15 by the asset allocation algorithm.

Table 11

Offices CL-25 and CL-2
A/L Ratios

	Office CL-25			Office CL-2		
	−20% *Add'l*	*0%* *Add'l*	*+20%* *Add'l*	*−20%* *Add'l*	*0%* *Add'l*	*+20%* *Add'l*
Year	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*
1991	1·150	1·209	1·433	1·150	1·385	1·655
1993	1·150	1·150	1·306	1·150	1·321	1·566
1995	1·150	1·150	1·257	1·150	1·286	1·515
1997	1·150	1·150	1·241	1·150	1·268	1·486
1999	1·150	1·150	1·234	1·150	1·246	1·454
2001	1·150	1·150	1·238	1·150	1·233	1·435
2003	1·150	1·150	1·252	1·150	1·229	1·428
2005	1·150	1·150	1·272	1·150	1·233	1·430
2007	1·150	1·171	1·294	1·150	1·250	1·450
2009	1·135	1·208	1·320	1·150	1·292	1·499
2011	1·088	1·253	1·344	1·150	1·366	1·590
2013	1·058	1·326	1·354	1·150	1·545	1·818
2015	n/a	n/a	n/a	n/a	n/a	n/a

These show that an office which is not so unfortunate as to have an estate deficit may indeed retain much of its investment freedom as time passes, provided that its bonus declarations are low enough to allow a significant terminal bonus to accumulate. The robustness of this assertion in the face of investment "shocks" has to be tested, and this is the topic of the next section.

6.4 *Responses to Investment "Shocks"*

The previous section shows that the option of closing the fund is not clearly inferior to continued trading, unless there is a negative estate. In so saying, we are looking purely at the levels of payouts and security for policyholders at the time of closure, and we are not considering more philosophical points such as the benefits to future policyholders of keeping the office in being. These were discussed in Section 2.

The conclusions of the previous section already have a certain amount of robustness, because of the features of the A/L ratio which determined the investment strategy.

(a) The valuation interest rate was determined by the assets, so there was a degree of matching, however crude, between the assets and the liabilities. Thus, if the A/L ratio reached its "danger" level of 1.15, there remained a considerable period of time during which remedial action could be taken by adjusting the assets. The A/L ratio thus acted as effective early warning system.

(b)   The valuation basis penalised the riskier assets (equities) and favoured the safer assets (gilts). Whatever the pros and cons of this in normal circumstances, it has much to recommend it in a closed fund with a limited time horizon.

(c)   The definition of liabilities included a mismatching reserve which allowed for a 25% fall in share prices, and the A/L ratio allowed roughly for a further 15% margin.

Nevertheless, the previous results show that there are adequate margins if the worst does not happen (i.e. if the fall in equity prices does not take place); they do not show that the system holds up if the worst does happen. To examine this, the Group looked at three scenarios in which the investments suffered a moderate blow.

Scenario 1 :   Share prices fell by 25% over 1991, thereafter reverting to 6% growth per year.

Scenario 2 :   Share prices fell by 25% over 2001, thereafter reverting to 6% growth per year.

Scenario 3 :   Gross dividend yields fell from 4·5% to 4·0% in 1991, and remained at 4·0% thereafter.

The first two supposed that the fall in equity prices did not affect the dividend yield; they represented a fall in price caused by dividend cuts. Their effect was to reduce both the fund and the asset shares, without directly affecting the liabilities (since the dividend yields were unchanged, so was the valuation basis) although if the assets fell by enough to bring the A/L ratio below the "danger level" of 1·15, then they would have to be re-arranged and the value of the liabiities would then change. The main purpose of these scenarios, then, was to examine the effect of a "shock" which principally affected asset values.

Note that the A/L ratios just after the "shock" included mismatching reserves on an unchanged basis. This was perhaps a severe assumption, as was the assumption of a 25% cut in dividends,but it may be supposed that the mismatching test, even if it was relaxed for a while by G.A.D., would soon be restored when share prices started to grow again.

The third scenario supposed that the dividend yield fell without any immediate change in share prices. This would be the case if dividends were cut without being reflected in the market's valuation of the shares. However unlikely this may be, its effect was to increase the liabilities immediately, by reducing the valuation interest rate to be used in the statutory minimum valuation. Asset values would not change at once, although the total rate of return would be slightly lower in all future years. The purpose of this scenario was to test the effect of a shock which principally affected the value of the liabilities. Perhaps the most likely event in practice would be some combination of scenario 1 or 2 with a rise in dividend yields.

Table 12 shows the effect on all four offices of the first scenario.

Table 12

Effect of 25% fall in share prices in 1991
(A)   Percentage invested in Equities.

	Office MUT-25			Office MUT-2		
	−20%	0%	+20%	−20%	0%	+20%
	Add'l	Add'l	Add'l	Add'l	Add'l	Add'l
Year	Estate	Estate	Estate	Estate	Estate	Estate
1991	79·9%	100·0%	100·0%	93·7%	100·0%	100·0%
1993	30·4%	54·1%	79·8%	12·3%	67·2%	100·0%
1995	33·2%	53·7%	75·7%	0·0%	61·8%	100·0%
1997	39·6%	57·1%	75·9%	0·0%	58·7%	100·0%
1999	44·9%	60·3%	76·7%	0·0%	54·9%	100·0%
2001	48·0%	62·7%	78·3%	0·0%	53·3%	100·0%
2003	50·9%	65·0%	79·9%	0·0%	54·4%	100·0%
2005	53·6%	67·3%	81·8%	0·0%	57·4%	100·0%
2007	56·4%	70·0%	83·9%	0·0%	62·8%	100·0%
2009	59·4%	73·2%	86·5%	0·0%	69·3%	100·0%
2011	62·6%	76·7%	89·6%	0·0%	75·4%	100·0%
2013	66·0%	80·2%	92·9%	0·0%	80·6%	100·0%
2015	69·4%	83·5%	96·0%	0·0%	84·5%	100·0%

	Office CL-25			Office CL-2		
	−20%	0%	+20%	−20%	0%	+20%
	Add'l	Add'l	Add'l	Add'l	Add'l	Add'l
Year	Estate	Estate	Estate	Estate	Estate	Estate
1991	73·9%	100·0%	100·0%	94·5%	100·0%	100·0%
1993	21·1%	44·9%	74·1%	15·4%	64·6%	100·0%
1995	15·2%	40·1%	70·1%	2·6%	57·9%	98·0%
1997	10·3%	37·1%	68·1%	0·0%	51·9%	97·7%
1999	2·8%	32·8%	65·9%	0·0%	42·8%	96·5%
2001	0·0%	28·1%	64·4%	0·0%	33·3%	96·9%
2003	0·0%	22·7%	63·6%	*	24·0%	100·0%
2005	0·0%	14·9%	63·1%	*	14·2%	100·0%
2007	0·0%	4·7%	63·2%	*	6·9%	100·0%
2009	*	0·0%	64·3%	*	5·0%	100·0%
2011	*	0·0%	63·6%	*	11·1%	100·0%
2013	*	0·0%	43·7%	0·0%	56·6%	100·0%
2015	n/a	n/a	n/a	n/a	n/a	n/a

* Denotes an office which has an A/L ratio of less than 1.0. Note that the A/L ratio includes a mismatching reserve.

(B)   *Relative Maturity Values*

*Maturity Values as percentage of MV in continuing mutual
with no additional estate.*

	Office MUT-25			Office MUT-2		
Year	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
1991	99·8%	100·0%	100·0%	100·0%	100·0%	100·0%
1995	105·1%	100·0%	101·9%	98·2%	100·0%	102·4%
1999	103·1%	100·0%	103·7%	92·8%	100·0%	106·3%
2003	101·1%	100·0%	105·0%	88·6%	100·0%	110·6%
2007	99·1%	100·0%	105·8%	84·9%	100·0%	114·0%
2011	96·9%	100·0%	106·1%	81·4%	100·0%	115·4%
2015	95·0%	100·0%	106·1%	78·1%	100·0%	114·7%

	Office CL-25			Office CL-2		
Year	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
1991	89·4%	99·6%	112·5%	84·9%	99·8%	114·7%
1995	95·5%	98·9%	113·7%	83·6%	99·6%	117·0%
1999	91·3%	97·1%	114·8%	79·1%	99·0%	121·1%
2003	85·7%	94·2%	114·9%	75·4%	97·3%	125·6%
2007	79·7%	90·3%	110·9%	73·4%	93·8%	129·5%
2011	74·5%	85·2%	112·5%	72·0%	88·9%	131·0%
2015	70·2%	81·0%	108·4%	66·8%	87·4%	130·5%

(C)   *A/L Ratios*

	Office MUT-25			Office MUT-2		
	−20%	*0%*	*+20%*	*−20%*	*0%*	*+20%*
	Add'l	*Add'l*	*Add'l*	*Add'l*	*Add'l*	*Add'l*
Year	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*
1991	1·150	1·248	1·479	1·150	1·394	1·678
1993	1·150	1·150	1·150	1·150	1·150	1·182
1995	1·150	1·150	1·150	1·143	1·150	1·175
1997	1·150	1·150	1·150	1·099	1·150	1·182
1999	1·150	1·150	1·150	1·060	1·150	1·187
2001	1·150	1·150	1·150	1·038	1·150	1·202
2003	1·150	1·150	1·150	1·032	1·150	1·225
2005	1·150	1·150	1·150	1·038	1·150	1·253
2007	1·150	1·150	1·150	1·056	1·150	1·288
2009	1·150	1·150	1·150	1·081	1·150	1·325
2011	1·150	1·150	1·150	1·106	1·150	1·357
2013	1·150	1·150	1·150	1·127	1·150	1·383
2015	1·150	1·150	1·150	1·144	1·150	1·403

	Office CL-25			Office CL-2		
	−20%	*0%*	*+20%*	*−20%*	*0%*	*+20%*
	Add'l	*Add'l*	*Add'l*	*Add'l*	*Add'l*	*Add'l*
Year	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*
1991	1·150	1·209	1·433	1·150	1·385	1·655
1993	1·150	1·150	1·150	1·150	1·150	1·152
1995	1·150	1·150	1·150	1·150	1·150	1·150
1997	1·150	1·150	1·150	1·110	1·150	1·150
1999	1·150	1·150	1·150	1·054	1·150	1·150
2001	1·126	1·150	1·150	1·009	1·150	1·150
2003	1·092	1·150	1·150	·975	1·150	1·150
2005	1·056	1·150	1·150	·951	1·150	1·172
2007	1·023	1·150	1·150	·941	1·150	1·206
2009	·997	1·130	1·150	·939	1·150	1·258
2011	·981	1·104	1·150	·950	1·150	1·322
2013	·994	1·110	1·150	1·022	1·150	1·411
2015	n/a	n/a	n/a	n/a	n/a	n/a

The following observations may be made.

(a) Unless they have a substantial additional estate, the closed funds are much more vulnerable to the investment shock than the offices which continue to trade. Both offices with estate deficits become insolvent despite switching their investments entirely into gilts (which is to say, they would in practice have to cut their bonus rates to even lower levels than were assumed).

(b) If the office has a substantial additional estate which may be distributed, the closed fund is fairly well protected and the constraints on its investments are not very different from those of the offices which continue to trade. Clearly there would be some level of additional estate between 0% and the +20% which we assumed, at which the distribution of the estate would roughly balance the effects of more severe investment constraints in the closed fund.

(c) The curious result in Table 12(B) for office MUT-25, in which a 20% estate deficit gives rise to better maturity values, for a limited period, than a nil additional estate, arises because the office with the 20% estate deficit is forced to invest about a quarter of its fund in gilts in the year 1991, and so the effect of the fall in share prices is less.

Table 12 shows the effect of an investment "shock" very soon after the date of closure to new business. It may be expected that the office's vulnerability would change over time; Table 13 therefore shows the effect of the same "shock" happening 10 years after closure, so that share prices are assumed to fall by 25% over the year 2001.

Table 13

Effect of 25% fall in share prices in 2001

(A)   Percentage invested in Equities

Office MUT-25

Year	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
1991	79·9	100·0	100·0
1993	68·0	98·1	100·0
1995	61·6	89·2	100·0
1997	60·8	85·3	100·0
1999	61·0	83·0	98·9
2001	61·2	82·2	97·1
2003	26·4	35·1	43·4
2005	30·3	39·0	47·3
2007	33·7	42·5	51·0
2009	37·0	46·2	55·0
2011	40·4	50·0	59·4
2013	44·2	54·4	64·4
2015	48·9	59·9	70·5

Office MUT-2

Year	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
1991	93·7	100·0	100·0
1993	80·6	100·0	100·0
1995	66·4	100·0	100·0
1997	52·3	100·0	100·0
1999	34·9	100·0	·100·0
2001	16·8	100·0	100·0
2003	0·0	22·9	83·6
2005	0·0	22·6	89·1
2007	0·0	26·2	96·5
2009	0·0	32·8	100·0
2011	0·0	40·4	100·0
2013	0·0	48·1	100·0
2015	0·0	56·0	100·0

Office CL-25

Year	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
1991	73·9%	100·0%	100·0%
1993	63·2%	96·7%	100·0%
1995	56·2%	92·5%	100·0%
1997	51·5%	91·0%	100·0%
1999	45·8%	90·0%	100·0%
2001	39·8%	90·6%	100·0%
2003	0·0%	8·8%	33·8%
2005	0·0%	0·0%	24·9%
2007	0·0%	0·0%	11·6%
2009	*	0·0%	0·0%
2011	*	0·0%	0·0%
2013	*	*	*
2015	n/a	n/a	n/a

Office CL-2

Year	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
1991	94·5%	100·0%	100·0%
1993	86·6%	100·0%	100·0%
1995	80·4%	100·0%	100·0%
1997	74·7%	100·0%	100·0%
1999	65·7%	100·0%	100·0%
2001	55·8%	100·0%	100·0%
2003	0·0%	10·2%	65·8%
2005	0·0%	0·0%	60·9%
2007	*	0·0%	59·0%
2009	*	0·0%	65·1%
2011	*	0·0%	85·2%
2013	0·0%	0·0%	100·0%
2015	n/a	n/a	n/a

* Denotes an office which has an A/L ratio of less than 1.0. Note that the A/L ratio includes a mismatching reserve.

(B)   *Relative Maturity Values*

Maturity Values as percentage of MV in continuing mutual with no additional estate.

	Office MUT-25			Office MUT-2		
Year	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
1991	99·8%	100·0%	100·0%	100·0%	100·0%	100·0%
1995	97·3%	100·0%	100·2%	98·4%	100·0%	100·0%
1999	95·1%	100·0%	101·5%	94·4%	100·0%	100·0%
2003	101·0%	100·0%	97·3%	118·2%	100·0%	101·4%
2007	100·4%	100·0%	98·2%	114·7%	100·0%	107·8%
2011	100·0%	100·0%	99·1%	110·1%	100·0%	114·2%
2015	99·6%	100·0%	100·2%	103·7%	100·0%	118·4%

	Office CL-25			Office CL-2		
Year	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
1991	89·4%	99·6%	112·5%	84·9%	99·8%	114·7%
1995	86·9%	99·5%	112·4%	84·2%	99·8%	114·4%
1999	84·3%	100·0%	113·7%	82·5%	99·8%	114·1%
2003	94·4%	97·0%	107·7%	93·5%	99·6%	115·2%
2007	90·9%	93·9%	106·7%	90·9%	97·6%	119·6%
2011	87·1%	90·1%	102·9%	87·4%	94·7%	122·9%
2015	83·9%	87·2%	99·3%	83·7%	92·8%	127·9%

(C)   *A/L Ratios*

	Office MUT-25			Office MUT-2		
	–20%	*0%*	*+20%*	*–20%*	*0%*	*+20%*
	Add'l	*Add'l*	*Add'l*	*Add'l*	*Add'l*	*Add'l*
Year	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*
1991	1·150	1·248	1·479	1·150	1·394	1·678
1993	1·150	1·150	1·314	1·150	1·320	1·599
1995	1·150	1·150	1·215	1·150	1·266	1·543
1997	1·150	1·150	1·170	1·150	1·230	1·508
1999	1·150	1·150	1·150	1·150	1·192	1·471
2001	1·150	1·150	1·150	1·150	1·164	1·449
2003	1·150	1·150	1·150	1·099	1·150	1·151
2005	1·150	1·150	1·150	1·054	1·150	1·150
2007	1·150	1·150	1·150	1·028	1·150	1·150
2009	1·150	1·150	1·150	1·021	1·150	1·178
2011	1·150	1·150	1·150	1·024	1·150	1·225
2013	1·150	1·150	1·150	1·032	1·150	1·270
2015	1·150	1·150	1·150	1·043	1·150	1·311

	Office CL-25			Office CL-2		
	–20%	*0%*	*+20%*	*–20%*	*0%*	*+20%*
	Add'l	*Add'l*	*Add'l*	*Add'l*	*Add'l*	*Add'l*
Year	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*
1991	1·150	1·209	1·433	1·150	1·385	1·655
1993	1·150	1·150	1·306	1·150	1·321	1·566
1995	1·150	1·150	1·257	1·150	1·286	1·515
1997	1·150	1·150	1·241	1·150	1·268	1·486
1999	1·150	1·150	1·234	1·150	1·246	1·454
2001	1·150	1·150	1·238	1·150	1·233	1·435
2003	1·133	1·150	1·150	1·091	1·150	1·150
2005	1·085	1·133	1·150	1·033	1·121	1·150
2007	1·038	1·084	1·150	·992	1·075	1·150
2009	·998	1·042	1·128	·969	1·051	1·150
2011	·962	1·006	1·068	·967	1·045	1·150
2013	·944	·992	·996	1·027	1·102	1·260
2015	n/a	n/a	n/a	n/a	n/a	n/a

The effect of the investment shock in 2001 is much more serious than the shock in 1991, both for the continuing mutual offices and the closed offices. Mainly this is because the margins between the office's total asset shares and total liabilities fall between 1991 and 2001 (see the discussion following Table 3 in Section 6.2).

Some specific points are :

(a) In the years after 2001, the continuing mutual offices show a resilience, or an ability to recover from the shock, which the closed offices do not. The proportionately higher income of the continuing offices after the shock tends to stabilise the business (in the absence of further shocks) as the proportion of the funds which have been unaffected by the shock builds up, and the policies which were in force at the time of the shock are gradually replaced by new policies which are unaffected by the shock. This calming influence is, of course, unavailable to the closed fund. Consequently, the managers of a closed fund have much less opportunity to take remedial action following poor investment performance.

(b) The influence of the pattern of business written immediately before (and after) a shock explains why the later shock is so much more serious than the earlier shock for office MUT-25. This is another manifestation of the "flywheel" effect associated with the bulge of mortgage business written before 1990, and discussed in Section 4.5. If the shock takes place in 1991, then within a few years such a large proportion of the assets will represent the accumulation of premiums paid after the shock that the importance of the shock is greatly diminished. However, if the shock takes place in 2001 then the accumulation of the premiums paid between 1991 and 2000 is also affected.

(c) Both closed funds with negative estates are shown as being insolvent after the shock (i.e. they have A/L ratios of less than 1). In practice, perhaps insolvency would not occur; the A/L ratio includes a mis-matching reserve, and the projections do not allow for any cuts in rever-sionary bonuses which would probably be made in the circumstances. Even so, the effect on the investment policy would still be to force most or all of the fund into gilts.

(d) The phenomenon in Table 12(B) remarked upon earlier, whereby the office with the −20% additional estate achieves better maturity values than the office with no additional estate, for a limited period after the shock, by virtue of being invested more heavily in gilts, appears to an even more striking degree in both continuing offices (see 13(B) above).

These tables show that the investment strategy and the investment conditions which

the Group assumed allow the closed funds to survive a shock, but that they would then be forced to move their investments largely or entirely into gilts, and that they would subsequently be unlikely to resume a high equity strategy; even if there was such exceptional growth in equities that the "shock" were reversed, the closed funds would not benefit unless they were mismatched, by which we mean more heavily invested in equities than allowed by the "A/L ratio > 1.15" criterion. The fund is being forced into buying and holding gilts when equities are cheap, and it may then be locked out of any recovery in the equity market. This feature of the valuation Regulations has been commented upon before by others.

The tables suggest the following:

(1) Unless the office has an estate deficit at closure, it could have as much investment freedom, given steady investment conditions, after it closed as if it had continued to trade as a mutual.

(2) The investment freedom of a closed fund would be more severely and irreversibly impaired than the investment freedom of a continuing mutual office, following a fall in market values of the assets.

Thus it does not appear to be inevitable that a closed fund will give poorer value to policyholders than a continuing fund, although it is the case that the consequences of poor investment performance will be more severe. (2) shows that it is not enough for an actuary who may be assessing the option of closing the fund to consider the effects of different future rates of return; the effects of changes in the market values of assets should also be considered. Although we have not had time to do so, an actuary who considers this option might ideally consider the results of projections of the closed office under stochastically generated financial conditions. However they are considered, the possible effects of changes in asset values (especially those unaccompanied by a corresponding increase in yield) may lead to the conclusion that it would be imprudent for the closed fund to adopt as free an investment strategy as the continuing office, depending on the frequency and the severity of shocks considered likely.

Table 14 shows the effect of a permanent fall in the gross equity dividend yield from 4·5% to 4·0%. The value of the liabilities will immediately rise, which may cause the assets to be re-arranged; any changes in maturity values will stem from the latter cause as well as the reduced future dividend receipts.

Table 14

Effect of fall in gross dividend yield from 4·5% to 4·0% in 1991.

(A)   *Percentage invested in Equities.*

	Office MUT-25			Office MUT-2		
	−20%	*0%*	*+20%*	*−20%*	*0%*	*+20%*
	Add'l	*Add'l*	*Add'l*	*Add'l*	*Add'l*	*Add'l*
Year	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*
1991	79·9%	100·0%	100·0%	93·7%	100·0%	100·0%
1993	60·9%	88·5%	100·0%	73·3%	100·0%	100·0%
1995	54·7%	79·6%	97·7%	58·6%	100·0%	100·0%
1997	53·5%	75·5%	92·1%	44·2%	100·0%	100·0%
1999	53·5%	72·9%	88·2%	27·0%	95·2%	100·0%
2001	53·1%	71·9%	85·7%	9·9%	89·8%	100·0%
2003	53·0%	70·7%	84·1%	0·0%	85·3%	100·0%
2005	53·2%	70·2%	83·3%	0·0%	82·0%	100·0%
2007	53·6%	70·1%	83·1%	0·0%	79·9%	100·0%
2009	54·2%	70·5%	83·4%	0·0%	79·4%	100·0%
2011	54·9%	71·2%	84·0%	0·0%	79·4%	100·0%
2013	55·8%	72·1%	84·9%	0·0%	79·8%	100·0%
2015	57·1%	73·2%	86·0%	0·0%	80·5%	100·0%

	Office CL-25			Office CL-2,/		
	−20%	*0%*	*+20%*	*−20%*	*0%*	*+20%*
	Add'l	*Add'l*	*Add'l*	*Add'l*	*Add'l*	*Add'l*
Year	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*	*Estate*
1991	73·9%	100·0%	100·0%	94·5%	100·0%	100·0%
1993	57·4%	88·1%	100·0%	78·8%	100·0%	100·0%
1995	49·8%	82·9%	100·0%	71·4%	100·0%	100·0%
1997	44·4%	80·2%	100·0%	63·8%	100·0%	100·0%
1999	37·8%	77·6%	100·0%	53·1%	100·0%	100·0%
2001	31·0%	75·8%	100·0%	41·0%	100·0%	100·0%
2003	23·0%	75·0%	100·0%	27·6%	100·0%	100·0%
2005	12·5%	75·2%	100·0%	11·4%	100·0%	100·0%
2007	0·0%	76·2%	100·0%	0·0%	100·0%	100·0%
2009	0·0%	80·7%	100·0%	0·0%	100·0%	100·0%
2011	0·0%	91·1%	100·0%	0·0%	100·0%	100·0%
2013	0·0%	100·0%	100·0%	0·0%	100·0%	100·0%
2015	n/a	n/a	n/a	n/a	n/a	n/a

(B)   *Relative Maturity Values,*

Maturity Values as percentage of MV in continuing mutual with no additional estate

<table>
<tr><th></th><th colspan="3">Office MUT-25</th><th colspan="3">Office MUT-2</th></tr>
<tr><th>Year</th><th>−20%
Add'l
Estate</th><th>0%
Add'l
Estate</th><th>+20%
Add'l
Estate</th><th>−20%
Add'l
Estate</th><th>0%
Add'l
Estate</th><th>+20%
Add'l
Estate</th></tr>
<tr><td>1991</td><td>100·0%</td><td>100·0%</td><td>100·0%</td><td>100·0%</td><td>100·0%</td><td>100·0%</td></tr>
<tr><td>1995</td><td>98·6%</td><td>100·0%</td><td>100·7%</td><td>98·2%</td><td>100·0%</td><td>100·0%</td></tr>
<tr><td>1999</td><td>97·2%</td><td>100·0%</td><td>102·1%</td><td>94·1%</td><td>100·0%</td><td>100·0%</td></tr>
<tr><td>2003</td><td>96·0%</td><td>100·0%</td><td>103·2%</td><td>88·6%</td><td>100·0%</td><td>100·8%</td></tr>
<tr><td>2007</td><td>94·8%</td><td>100·0%</td><td>104·0%</td><td>83·7%</td><td>100·0%</td><td>102·1%</td></tr>
<tr><td>2011</td><td>93·9%</td><td>100·0%</td><td>104·5%</td><td>80·1%</td><td>100·0%</td><td>103·7%</td></tr>
<tr><td>2015</td><td>93·3%</td><td>100·0%</td><td>104·7%</td><td>77·8%</td><td>100·0%</td><td>105·0%</td></tr>
</table>

<table>
<tr><th></th><th colspan="3">Office CL-25</th><th colspan="3">Office CL-2</th></tr>
<tr><th>Year</th><th>−20%
Add'l
Estate</th><th>0%
Add'l
Estate</th><th>+20%
Add'l
Estate</th><th>−20%
Add'l
Estate</th><th>0%
Add'l
Estate</th><th>+20%
Add'l
Estate</th></tr>
<tr><td>1991</td><td>89·4%</td><td>99·6%</td><td>112·5%</td><td>84·9%</td><td>99·8%</td><td>114·7%</td></tr>
<tr><td>1995</td><td>87·4%</td><td>99·5%</td><td>112·9%</td><td>83·9%</td><td>99·8%</td><td>114·3%</td></tr>
<tr><td>1999</td><td>85·4%</td><td>99·8%</td><td>114·9%</td><td>81·8%</td><td>99·8%</td><td>114·2%</td></tr>
<tr><td>2003</td><td>83·0%</td><td>100·1%</td><td>117·3%</td><td>78·8%</td><td>100·5%</td><td>114·9%</td></tr>
<tr><td>2007</td><td>79·8%</td><td>100·4%</td><td>119·6%</td><td>75·0%</td><td>101·8%</td><td>116·5%</td></tr>
<tr><td>2011</td><td>76·4%</td><td>100·9%</td><td>121·3%</td><td>71·1%</td><td>103·2%</td><td>118·1%</td></tr>
<tr><td>2015</td><td>74·4%</td><td>103·5%</td><td>123·3%</td><td>70·0%</td><td>104·7%</td><td>119·8%</td></tr>
</table>

(C)   A/L Ratios

	Office MUT-25			Office MUT-2		
	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
Year						
1991	1·150	1·248	1·479	1·150	1·394	1·678
1993	1·150	1·150	1·223	1·150	1·252	1·517
1995	1·150	1·150	1·150	1·150	1·197	1·459
1997	1·150	1·150	1·150	1·150	1·159	1·420
1999	1·150	1·150	1·150	1·150	1·150	1·381
2001	1·150	1·150	1·150	1·150	1·150	1·356
2003	1·150	1·150	1·150	1·126	1·150	1·343
2005	1·150	1·150	1·150	1·086	1·150	1·338
2007	1·150	1·150	1·150	1·077	1·150	1·342
2009	1·150	1·150	1·150	1·048	1·150	1·354
2011	1·150	1·150	1·150	1·038	1·150	1·367
2013	1·150	1·150	1·150	1·041	1·150	1·379
2015	1·150	1·150	1·150	1·050	1·150	1·392

	Office CL-25			Office CL-2		
	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate	−20% Add'l Estate	0% Add'l Estate	+20% Add'l Estate
Year						
1991	1·150	1·209	1·433	1·150	1·385	1·655
1993	1·150	1·150	1·226	1·150	1·257	1·490
1995	1·150	1·150	1·179	1·150	1·221	1·437
1997	1·150	1·150	1·164	1·150	1·201	1·407
1999	1·150	1·150	1·158	1·150	1·179	1·375
2001	1·150	1·150	1·162	1·150	1·165	1·355
2003	1·150	1·150	1·175	1·150	1·160	1·346
2005	1·150	1·150	1·195	1·150	1·163	1·347
2007	1·143	1·150	1·216	1·134	1·178	1·363
2009	1·094	1·150	1·240	1·103	1·217	1·407
2011	1·051	1·150	1·263	1·094	1·285	1·487
2013	1·027	1·193	1·269	1·150	1·451	1·690
2015	n/a	n/a	n/a	n/a	n/a	n/a

The effect of the cut in dividends is not negligible; compared with Tables 1 and 9, the proportion of the fund invested in equities falls by up to 15%, or the A/L ratio falls by a similar amount, but the significant point is that there is little effect on the comparison between the continuing offices and the corresponding closed funds. The closed offices still have rather more investment freedom than the continuing mutual offices, with the same exception of office MUT-25/CL-25 with a –20% additional estate. The same pattern of A/L ratios falling and then rising (or the proportion invested in equities falling and then rising) is apparent.

Clearly the effect of the dividend cut is less severe than the effect of either of the two falls in equity price.

6.5 Demutualisation—Introduction

If a mutual office were to demutualise, it might change in many ways. Some of these are difficult to model; for example, the demutualised office might merge with, take over or be taken over by another proprietary company. In the simplest case, however, the new owners will run off the existing business as best they can, while continuing to transact new business, traditional or unit-linked or both.

In what follows, the distinction between policies in-force at the time of the demutualisation, and policies written after demutualisation, is very important. We will refer to the former as *existing business*, consisting of the policies of *existing policyholders*, and we will refer to the latter as *new business*, consisting of the policies of *new policyholders*.

There is a vast range of assumptions which could be made, concerning the changes which the new owners might make to investment and bonus strategies, and in particular the type and incidence of new business to be written after demutualisation. The Group examined two possibilities:

(a) The demutualised office may continue to write new with profits business on substantially the same terms as if the office had remained mutual. In this case, the greater part of the office's working capital will continue to be provided by the accrued terminal bonuses of in-force policies, and whether its position will ultimately be better or worse than that of the continuing mutual office will depend on the relative values of the purchase price and the stream of transfers to shareholders.

(b) Alternatively, the office may close the existing with-profit fund to new business, and transact other types of business in future, in which the existing policyholders will have no interest. They may continue to transact with-profit business but in a new bonus series. Possibly a block of assets representing the asset shares plus some or all of the additional estate plus part of the purchase price would be set aside for the closed fund. Assuming this were so, then the result (i.e. whether the

outcome is better or worse than simply closing the fund) will depend on the amount of the assets set aside, the stream of transfers to shareholders and the treatment of the additional estate.

We chose to model the simple cases outlined above in order to allow comparisons to be made easily with the continuing mutuals and the closed funds. We also made the following general assumptions about the demutualised offices:

(a) If the demutualised office continues to write with-profit business then it will write the same volume of new with-profit endowment business at the same premium rates as the mutual office would have done.

(b) 10% of the amount of all surplus distributed as reversionary or terminal bonus to existing policyholders is transferred from the life fund to shareholders, but these transfers are ignored in the calculation of the asset shares of the policies affected.

(c) 10% of the amount of surplus distributed as reversionary or terminal bonus to new with-profit policyholders (if any) is transferred from the life fund to shareholders, and these transfers are deducted from the asset shares of the policies affected.

(d) The demutualised office uses the same dynamic investment strategy as the continuing mutual offices and the closed funds.

(e) In the case that the with-profit fund is closed after the office is demutualised, there are no cross-subsidies between the closed with-profit fund and the rest of the office. In particular, the effect on investment freedom of any with-profit business written in a separate bonus series has been ignored.

The distinction between (b) and (c) is important. (b) means that all the surplus which would have been distributed to the policies of existing policyholders, had the office remained mutual, is still distributed, and that 10% of that amount is then transferred to shareholders. The existing policyholders therefore receive the same reversionary and terminal bonuses as they would have done in the absence of the shareholders, and the transfers to shareholders are charged to the estate. (c) means that new policyholders receive the same reversionary bonuses as they would have done in the absence of shareholders, but lower terminal bonuses to meet the cost of the transfers to shareholders. The transfers, in this case, are charged to the policyholders' asset shares and not to the estate.

It is also important to note the assumption that the shareholders receive 10% of the surplus actually distributed to policyholders, and not to mistake this for 10% of the surplus available for distribution to policyholders. In other words, we assumed that the shareholders' share of surplus is slightly less than the maximum possible.

We can only tackle a few of the many questions which may arise. Most of the remainder of Section 6 is devoted to the following questions.

What purchase price would be fair to existing policyholders and purchasers?

Would the additional investment freedom bestowed by the shareholders' capital make up for the transfers of surplus to the shareholders?

6.6   *Purchase Price*

It is convenient to regard the capital invested by the new proprietor as having three parts, namely

(a)   compensation to the existing policyholders for the profits which may arise from the existing business,

(b)   a consideration for the right to the profits from future new business (or "goodwill" payment),

(c)   additional capital to support higher levels of new business in future.

Part of the payment (b) may be distributed to the policyholders as a "sweetener", or additional incentive to encourage them to vote for demutualisation. The sweetener, and indeed the entire goodwill payment, will be the subject of negotiation, and probably cannot be calculated actuarially. The split between the different parts may be perceived in different ways by the different parties, because different actuarial bases will be appropriate to each. However, it seems inappropriate to regard (c) as part of any "price" intended to benefit the policyholders, and when we refer to a "purchase price" we will mean (a) and (b). In most of what follows we have assumed that none of any goodwill payment is distributed at the time of demutualisation; in other words we have ignored the possible effect of a sweetener.

Consider first the price to be paid for the existing business. The shareholders will receive transfers in respect of bonuses paid to existing policyholders, and the cost of these transfers will be borne by the life fund. Theoretically, the purchase price ought to be the actuarial value of these transfers. If, however, there is an element of "forced sale" about the demutualisation, the buyer may be able to extract concessions (subject to an independent actuary being able to agree that the scheme is not unfair). On the other hand, if the buyer sees good prospects of profit from the future new business, then he or she may be willing to over-compensate the existing policyholders. The price will depend on the negotiating strengths of the two parties at least as much as on the actuarial aspects. However, a convenient starting point for modelling is to calculate a "fair" price from the point of view of the policyholders, as follows.

(a)   Assume that the assets will earn a fixed net rate of return in future, so that the split between gilts and equities will be irrelevant. This assumption is made to simplify the calculation of the price. In reality, the net rate of return earned in future may depend on the gilt/equity split, with the result that the calculated price may turn

out to be unrealistic; this possibility is explored in Section 6.7. In practice, we believe that price calculations would probably be carried out using such simplified investment assumptions.

(b) Assume that, after demutualisation, the existing policyholders will receive the same reversionary bonuses, plus terminal bonuses based on the same proportion of the earned asset share as before. Calculate the cost of bonus in each year, and assume that 10% of these amounts will be given to the shareholders, without, however, taking these outgoings into account in calculating the asset shares of the existing policyholders. The benefits paid to these policyholders will therefore be the same as they would have been had no transfers of surplus taken place.

Note that the cost of reversionary bonus must be based on the office's published valuation basis (described in Section 5.7) and not the statutory minimum valuation basis. This was the only point in any of our modelling where the published valuation basis was used.

(c) Find the purchase price by discounting the stream of transfers at the net rate of return assumed to be earned on the life fund.

We calculated some examples of purchase prices for the offices MUT-25 and MUT-2. As would be expected, the price to be paid depends on the rate of return which is earned by the life fund, and to show the effect of this we used rates of return of 9% and 12% (net). Note that this is a fixed rate of return, and that we have not used the dynamic investment strategy in these calculations. Further, the incidence of the transfers to shareholders depends on the bonus policy; one way to accelerate the release of the shareholders' profits would be to raise reversionary bonus rates at the expense of terminal bonus rates (although this might result in lower transfers in the long term if the higher guarantees reduced the investment freedom). We therefore included a third basis, in which the net rate of return on the life fund was 12% and the rates of reversionary bonus were increased by 1% at the time of the purchase. Table 15 shows examples of purchase prices expressed as a percentage of the assets of an office *with no additional estate* just before purchase. The bases 1 to 3 referred to in the table are as follows:

		Basis 1	*Basis 2*	*Basis 3*
Net Rate of Return on Life Fund		9·0%	12·0%	12·0%
Reversionary Bonus during 1990-1993	(on Sum Assured)	2·5%	2·5%	3·5%
	(on Bonus)	5·0%	5·0%	6·0%
Reversionary Bonus after 1994	(on Sum Assured)	2·0%	2·0%	3·0%
	(on Bonus)	4·0%	4·0%	5·0%

Table 15

Examples of Purchase Prices for Existing Business expressed as a percentage of the assets.

Office	Basis 1	Basis 2	Basis 3
MUT-25	16·1%	16·7%	18·2%
MUT-2	10·5%	11·1%	11·7%

Whether these prices would also be regarded as acceptable by the potential purchaser depends on the latter's required rate of return and on the tax position of the office after demutualisation.

(a) It is unlikely that a purchaser would choose a net risk discount rate lower than the assumed net rate of return on the fund.

(b) If the demutualised office were to be taxed on an "I-E" basis in future, then the transfers to shareholders calculated as above would be the net transfers, and it would be appropriate to discount them at the purchaser's required net rate of return (allowing for risk) to find a price which the purchaser would regard as fair.

(c) If it was likely that the demutualised office would be taxed on a profits basis in any future years, then the net transfers would be less than those calculated above, and the purchaser's fair price would be lower than the policyholders' fair price, even if both parties were to use the same discount rate.

A net risk discount rate for shareholders of 9% or 12% may be quite low, but on the other hand a net rate of return on the life fund of 9% or 12% is quite high. The purchaser would presumably prefer to base the price on a low rate of return on the life fund, but a high discount rate, whereas the life office would prefer to base the price on a high rate of return on the life fund and a low discount rate. In practice, however, it may be difficult for the life office to justify any discount rate other than the assumed net rate of return on the fund. The purchaser, who would be purchasing an investment with some risk, is not so constrained.

Of course, all that matters is that the purchaser and the policyholders agree on the total price; they need not agree on each of its constituent parts. We have, however, calculated some examples of a "fair" price from the shareholders' point of view, by discounting the transfers to the shareholders arising under Bases 1, 2 and 3 above, at a range of net risk discount rates. The results are shown in Table 16. There is obviously a wide range of "fair" prices.

Table 16

Purchase price for existing business (percentage of fund)

Office MUT-25

		Shareholders' net risk discount rate		
Basis	9%	12%	15%	20%
1	16·1%	11·8%	9.0%	6·3%
2	24·2%	16·7%	12.1%	7·9%
3	25·9%	18·2%	13.5%	9·0%

Office MUT-2

		Shareholders' net risk discount rate		
Basis	9%	12%	15%	20%
1	10·5%	8·1%	6·5%	4·8%
2	14·9%	11·1%	8·6%	6·0%
3	15·6%	11·7%	9·1%	6·5%

In principle, the same methods could be used to put a value on the profits from future new business, which arguably might form part of a fair purchase price. In practice, it would be very difficult, if not impossible, to calculate a realistic price in this way. The following remarks indicate the nature of the actuarial difficulties.

(a) The stream of future profits is of indeterminate duration; it may be a perpetuity. A purchaser cannot be expected to pay in advance for an infinite stream of profits.

(b) The size of the stream of future profits is also highly uncertain, in fact so uncertain that it is doubtful if any meaningful calculation of their value could be made. For example, it could not be known what type of business would be sold, and what profit margins the market would allow, except for the very near future. At the very least, the discount rate would be extremely high in view of the risk.

(c) The tax position of the demutualised office may be uncertain.

(d) A certain level of future new business may be sustainable without any further investment of capital. For example, the office may continue to write with-profit business, which may finance itself provided that the rate of new business growth is not excessive. It seems reasonable for the policyholders to sell this asset rather than to give it away. On the other hand, there seems to be little reason for the policyholders to be paid for the profits from any new business which requires further capital from the purchaser before it can be written.

(e) If allowance were made for future new business growth, then the price would be extremely sensitive to small changes in both the assumed rate of new business growth and the discount rate.

These problems are familiar to actuaries who carry out embedded value calculations for proprietary offices. Purely for illustration, we calculated some sample values of profits from future with-profits business. We used the same interest and bonus assumptions as in Bases 1, 2 and 3 above. In addition, we considered the effect of Basis 2 with a slightly higher rate of new business growth (7% + RPI instead of 2%+RPI); we called this Basis 4. The transfers were discounted at net discount rates of 9%, 12%, 15% and 20%, and the results are shown in Table 17, expressed as a percentage of the office's funds at the time of demutualisation. These figures ignore capital requirements which might arise as a result of valuation constraints.

Table 17

Value of profits from new business (percentage of fund)

Office MUT-25

	Shareholders' net risk discount rate			
Basis	*9%*	*12%*	*15%*	*20%*
1	334·1%	53·3%	22·6%	9·1%
2	513·2%	75·9%	29·9%	11·0%
3	576·4%	90·7%	37·8%	14·9%
4	∞	∞	122·0%	19·1%

Office MUT-2

	Shareholders' net risk discount rate			
Basis	*9%*	*12%*	*15%*	*20%*
1	50·0%	8·0%	3·4%	1·4%
2	76·3%	11·3%	4·4%	1·6%
3	85·1%	13·4%	5·6%	2·2%
4	∞	∞	∞	13·2%

Notice that there is a large difference between the two offices. This is because, in MUT-25, the transfers in respect of future new business are based on the level of new business written at 1990, but the fund in terms of which the purchase price is expressed is relatively small, because most of the premium income arising from the business sold in the 10 years before 1991 has yet to be received.

In addition to these arithmetical difficulties, there would be practical objections to attaching much weight to such calculations. It is not at all clear that the existing policyholders "own" the profits from future new business; if the office remained mutual,

such profits would not even be called into existence. As long as their own position is satisfactory in the demutualised office, their right to even part of the value of profits on future new business may seem doubtful. Further, no purchaser would be willing to pay more than the cost of setting up a new life office from scratch.

However, the opportunity to write new business is a thing of value to the new owner, and its creation by the very act of demutualising calls to mind some other synergies which arise in life assurance business. As mentioned in (d) above, the demutualised office may have a capacity to write some level of new business without further capital being provided, and it does seem reasonable for the policyholders to share some of the value of that which they have helped to create. This might take the form of a goodwill payment, beyond the sum which secures their own benefits. The amount of any goodwill payment would be unlikely to have any basis in actuarial theory. As mentioned previously, the purchaser and the policyholder may view the split of the price in different ways, since they will probably use different bases of calculation. In practice, the total price will be determined mainly by the negotiating abilities of each party.

The policyholders would only gain directly from a goodwill payment if it was distributed to them. Otherwise, they would hope to benefit indirectly, by having greater investment freedom, but the funds represented by the payment would stay with the office. One possible arrangement would be to distribute part of a goodwill payment as a "sweetener".

Note that all of the prices calculated above were based on an office with no additional estate. Expressed in terms of the office's assets, the price for an office with a positive additional estate would be lower, and the price for an office with an estate deficit would be higher, although the monetary amount of the theoretical price would be the same in all cases.

6.7   *Demutualised Offices Writing New With-profit Business*

We made projections of the demutualised offices PROP-25 and PROP-2, using the same investment, bonus and new business assumptions as in Section 6.2. In particular, note that we returned to our dynamic investment strategy described in Section 6.1.2., rather than assuming a single fixed rate of interest as in Section 6.6. The question which we considered was

Will shareholders have to inject more capital after the office is demutualised?

Where might the need for new capital arise? If the office is fundamentally weak, it may not be able to demonstrate solvency (on the statutory minimum valuation basis) unless it adopts a very conservative investment strategy. Since the purchase prices were based on discounted transfers of surplus, they did not take into account structural

weaknesses such as estate deficits; indeed in practice such weaknesses might well escape notice if the asset shares could not be properly quantified. In our model, the conflict between the solvency standard and investment freedom is represented explicitly by the dynamic investment stategy. The new owners of the demutualised office face a choice; either take the company into sectors of the market where competition on the basis of maturity values can be avoided (for example, off-the-page selling), or aim to pay competitive maturity values. In the latter case, a reasonable strategy would be to maintain the same level of investment freedom as one's major competitors.

This gives us a standard to aim for. If we assume that, among the competing offices, there are several successful mutual offices, we may refer to Tables 1 and 2 to see how much investment freedom should be expected. Taking Offices MUT-25 and MUT-2 with no additional estate as a guide, we see that equity investment of 80% to 90% is called for. Therefore, the question above becomes, "what additional estate is needed to reach 80% to 90% investment in equities?"

In a demutualised office it is hard to distinguish the rôle of the additional estate and that of the purchase price. We therefore made projections of demutualised offices with specified levels of additional estate, just as before, but in this case it is possible to interpret all or part of the additional estate as a purchase price. In previous projections we used additional estates of –20%, 0% and +20% of the office's asset shares, since this range encompassed most of the features of interest. For these projections, we chose appropriate levels for the combined additional estate and purchase price by looking at the purchase prices shown in Table 16, and allowing for the fact that there may also be a goodwill payment, with the following results:

(a) For Office PROP-25, purchase prices of over 10% of the assets are indicated, at quite high rates of discount. Therefore additional estates in the range –20% to +20% of the asset shares seemed inadequate, and we chose to project additional estates of –20%, 0%, +20%, +40% and +60% of the asset shares. Thus, for example, a projection based upon an additional estate of +20% may be interpreted as an office with a 0% additional estate before demutualisation, for which a purchase price of +20% was paid.

(b) For Office PROP-2 the example purchase prices are more modest. Therefore the range of additional estates of –20% to +20% seemed adequate, and we chose to project additional estates of –20%, –10%, 0%, +10% and +20% of the asset shares. Thus, for example, a projection based upon an additional estate of +10% may be interpreted as an office with a +5% estate before demutualisation, for which a purchase price of +5% was paid.

In making the comments above we have ignored a minor inconsistency in our definitions, namely that the additional estates are defined in terms of the office's asset

shares whereas the purchase prices in Table 16 are defined in terms of the office's assets. Since the model offices are set up with no additional estate at time 1989, the differences in the results are negligible.

Tables 18 and 19 show the proportions invested in equities in Offices PROP-25 and PROP-2 respectively.

Table 18

Office PROP-25
Percentage in Equities

	Additional Estate				
	<————————— *(% of Asset shares) at 1990* —————————>				
Time	*−20%*	*0%*	*+20%*	*+40%*	*+60%*
1991	78·2	100·0	100·0	100·0	100·0
1993	63·6	95·3	100·0	100·0	100·0
1995	53·9	83·7	100·0	100·0	100·0
1997	50·9	77·9	97·1	100·0	100·0
1999	49·4	73·8	91·9	100·0	100·0
2001	49·4	71·6	88·5	100·0	100·0
2003	49·5	69·6	86·1	98·9	100·0
2005	48·8	68·3	84·6	97·8	100·0
2007	48·1	67·3	83·8	97·3	100·0
2009	47·5	66·6	83·4	97·4	100·0
2011	46·6	65·8	83·1	97·7	100·0
2013	45·5	64·9	82·7	98·1	100·0
2015	44·3	63·6	81·9	98·1	100·0

Comparing Table 18 with Table 1 shows that Office PROP-25, with an additional estate of 20% or less of the assets shares, has rather less investment freedom than Office MUT-25 with no additional estate. Therefore, the purchase price for Office MUT-25 would have to be large enough to bring the funds up to about 120% of the asset shares to avoid the need for further finance in the next 25 years. That conclusion is, of course, dependent on our investment and new business assumptions.

Note also that the proportion invested in equities is still falling at the end of the projection period, instead of falling and then recovering, as in Table 1. In the very long term, some additional capital may be needed, but the purchaser may be unconcerned provided that the need is a sufficiently long way off.

Table 19

Office PROP-2
Percentage in Equities

| Time | Additional Estate <————— (% of Asset shares) at 1990 —————> | | | | |
	-20%	-10%	0%	+10%	+20%
1991	92·0	100·0	100·0	100·0	100·0
1993	74·5	100·0	100·0	100·0	100·0
1995	54·5	87·8	100·0	100·0	100·0
1997	40·6	75·1	100·0	100·0	100·0
1999	7·9	58·4	92·2	100·0	100·0
2001	0·0	40·6	81·8	100·0	100·0
2003	0·0	22·3	71·3	100·0	100·0
2005	0·0	4·0	61·1	98·5	100·0
2007	0·0	0·0	51·6	94·5	100·0
2009	0·0	0·0	44·2	91·9	100·0
2011	0·0	0·0	37·6	89·7	100·0
2013	0·0	0·0	31·6	87·8	100·0
2015	0·0	0·0	26·2	85·9	100·0

Comparing Table 19 with Table 2, Office PROP-2 with an additional estate of less than 10% has markedly less investment freedom than office MUT-2 with no additional estate. In fact, in PROP-2 with no additional estate the proportion invested in equities falls to 71·3% by time 2003 and to 26·2% by time 2015, whereas in MUT-2 it does not fall below 95% and is rising again after time 2007. If demutualisation did not bring with it a purchase price sufficient to bring the additional estate up to +10%, more capital might be needed in future to allow a competitive level of equity investment.

These figures suggest that it might not be worthwhile for a purchaser to take over a weak mutual office if it was intended to compete for with-profit business in future.

We return now to the second of our main questions, namely

Would the additional investment freedom bestowed by the shareholders' capital make up for the transfers of surplus to the shareholders?

Or, put more simply, what is in it for the policyholders? The relative advantage, to the policyholders, of one course of action over another depends very much on the circumstances, and the options open to them are a natural starting point.

In Section 6.3, we measured value for money to policyholders by comparing the maturity values emerging in the closed funds with those emerging in the continuing mutual office. Where these were different, the cause was the different investment strategy, the expenses of closure and the running down of the estate. In this section, we will compare the maturity values emerging in the demutualised office with the maturity values in the continuing mutual office, but this time we have to allow for the payment of the purchase price. We have assumed that none of the purchase price is used as a "sweetener" to enhance the asset shares of the existing policies.

We can formulate the question in this way: suppose a mutual office with an additional estate of $X\%$ of the asset shares demutualises for a purchase price of $Y\%$ of the asset shares, thus becoming a proprietary office with an additional estate of $(X+Y)\%$ of the asset shares; how will the maturity values be changed?

Each of the following tables is based on the maturity values emerging in a single year in future. Thus, Tables 20 and 22 are based on maturities taking place in 1999 and Tables 21 and 23 are based on maturities taking place in 2009, and so on. Down the left-hand side of each table is shown the additional estate of the office *before* demutualisation, and along the top of each table is shown the additional estate of the office *after* demutualisation. The difference is the purchase price. The figures shown in each table are the maturity values in the demutualised office expressed as a percentage of the maturity values (M.V.s) in the continuing mutual office.

We first considered the position of existing policyholders in Office MUT-25 or PROP-25, by looking at maturities in the years 1999 and 2009.

Table 20

Office MUT-25/PROP-25 in Year 1999
M.V. in PROP-25 as percentage of M.V. in MUT-25

Additional Estate before demut.	<———————— (% of Asset shares) ————————> Additional estate after demutualisation				
	−40%	−20%	0%	+20%	+40%
−40%	98·2	107·5	113·5	115·9	116·2
−20%		98·8	104·3	106·5	106·7
0%			99·2	101·3	101·5
+20%				99·8	100·0
+40%					100·0

Table 21

Office MUT-25/PROP-25 in Year 2009
M.V. in PROP-25 as percentage of M.V. in MUT-25

Additional Estate before demut.	Additional estate after demutualisation				
	<———————— (% of Asset shares) ————————>				
	–40%	–20%	0%	+20%	+40%
–40%	95·8	107·5	117·2	123·8	127·5
–20%		96·1	104·8	110·7	113·9
0%			96·4	101·9	104·9
+20%				97·4	100·3
+40%					99·7

The figures in Tables 20 and 21 show the range of purchase prices which confer an advantage on the existing policyholders. First, unless MUT-25 has an estate deficit, there is little benefit to be gained, principally because it is possible to invest largely in equities without demutualising. If there is an estate deficit, however, then a purchase price of about 10% of the asset shares is enough to give higher maturity values. As Table 16 shows, such a purchase price may be rather low.

Turning now to the existing policyholders in Offices MUT-2 and PROP-2, Tables 22 and 23 show the relative maturity values in 1999 and 2009.

Table 22

Office MUT-2/PROP-2 in Year 1999
M.V. in PROP-2 as percentage of M.V. in MUT-2

Additional Estate before demut.	Additional estate after demutualisation				
	<———————— (% of Asset shares) ————————>				
	–20%	–10%	0%	+10%	+20%
–20%	97·9	103·6	106·0	106·0	106·0
–10%		98·6	100·9	100·9	100·9
0%			99·9	99·9	99·9
+10%				99·9	99·9
+20%					99·9

Table 23

Office MUT-2/PROP-2 in Year 2009
M.V. in PROP-2 as percentage of M.V. in MUT-2

Additional Estate before demut.	Additional estate after demutualisation <———— (% of Asset shares) ————>				
	–20%	–10%	0%	+10%	+20%
–20%	96.8	105.7	119.9	128.3	128.8
–10%		90.5	102.6	109.8	110.3
0%			93.5	100.0	100.5
+10%				99.6	100.0
+20%					100.0

As in Office MUT-25, if the estate is in surplus then there will be little point in demutualising, because the mutual retains sufficient investment freedom. If, however, the estate is in deficit then a price of between 5% and 10% of the asset shares would be beneficial, the more so if it avoids the need to close the fund (see Table 10).

The benefit derived from the purchase price is indirect, depending on the assumed gap between the net rate of return on gilts and the net rate of return on equities. The investment assumptions underlying Tables 20—33 result in net rates of return of 6·75% on gilts and 9·375% on equities, a difference of 2·625%. The effect of a larger or smaller gap is examined, for Office MUT-25, in Appendix 6.

Taken in conjunction with Table 16, these tables suggest that the policyholders in a mutual office, which is not so strong that it has absolute investment freedom, might benefit from demutualisation at a price calculated at a risk discount rate of 15% or more. If it has an additional estate which would be distributed on closure, however, then closure might appear to be more attractive (although closing the fund might make it more vulnerable to investment shocks; see Section 6.4).This supposes that the existing policyholders continue to receive benefits in the demutualised office of the same general level as they would have done had the office remained mutual.

The Group carried out similar calculations, using the same investment and bonus assumptions as above, for policies maturing in 2019, 2029 and 2039, in order to explore the possibility that the extra investment freedom made possible by the demutualisation might be worth more than the transfers to shareholders, which, in the case of new policyholders, were assumed to be paid for by deductions from their asset shares. The results are not shown here, but they may be described briefly as follows:

(a) If there was a large estate deficit before demutualisation, (40% in the case of Office PROP-25, or 20% in the case of Office PROP-2), resulting in severely constrained investment freedom, then it was possible for the maturity values

paid to policies taken out after demutualisation to exceed the maturity values paid to similar policies in the corresponding mutual office. For Office PROP-25, the price required was more than 40% of the asset shares, while in for Office PROP-2, the price required was less than 20% of the asset shares.

(b) Maturity values fell as time passed, so that policies maturing in 2039 received less, relative to a similar policy in a mutual office, than did a policy maturing in 2019.

6.8 *A Closed With-profit Fund in a Demutualised Office*

The second course of action which we considered was that of the with-profit fund being closed and run off after demutualisation. This might happen if, for example, the new owner found the capital requirements of with-profit business too onerous, but wanted to write non-profit business (for example, unit-linked business). The main question which we examined was

How does the investment freedom of a closed fund within a demutualised office compare with the investment freedom of a closed mutual fund?

We made the following assumptions.

(a) All of the assets of the mutual office, plus a stated purchase price, were allocated to the closed with-profit fund. In other words, we assumed that these assets were not used to fund new business strain while any of the original policies remained in force. This implies that the new proprietors must have paid a larger price than that stated, in order to provide working capital during the run-off period; the stated price in our projections is that part of the total price which might be specifically set aside for the policyholders.

(b) After demutualisation, the existing policyholders would receive the same reversionary bonuses as they would have done had the office remained mutual.

(c) 10% of the amount of the cost of bonus would be given to the shareholders, without, however, taking these outgoings into account in calculating the asset shares.

(d) That part of the purchase price set aside for the with-profit policyholders was not distributed to them, except to the extent that their asset shares were calculated without allowing for the transfers of surplus to the shareholders. As a result, any assets remaining after the run-off period would be returned to the office.

(e) If the estate was in deficit just before demutualisation, then the terminal bonus scale would be reduced during the run-off period. For this purpose the benefits were based on the proportions of the asset shares stated in Table 8.

(f) If the estate was in surplus just before demutualisation, then the terminal bonus

scale would *not* be enhanced beyond that for an office with no additional estate. The surplus assets would be used to support the with-profit business, but only indirectly, and they would be left with the office afterwards.

Although (e) and (f) appear to be inconsistent, they represent what is, in each case, perhaps the most likely of the two extreme possible courses of action. A purchaser would not wish ultimately to be left with more than a modest identifiable estate deficit (perhaps representing a form of sweetener), and a mutual with an estate deficit would be in a weak bargaining position. On the other hand, a mutual with an additional estate might not be able to insist on the distribution of all of the additional estate. Our assumptions (e) and (f) represent a clear course of action which would not be attained in practice, given the difficulties of ensuring that segregated assets are not diverted to other uses, but they are a useful starting point. Time and space have limited the number of possibilities which we were able to examine.

The projections are based on offices PCL-25 and PCL-2 (see Section 5.12) with additional estates of –20%, 0% and +20%, in each case with a purchase price of 10% or 20% of the asset shares allocated to the with-profit fund.

Tables 24 and 25 show the proportions invested in equities.

Table 24

Percentage in equities
(Purchase price shown as percentage of asset shares)
Office PCL-25

	Estate deficit of 20% Purchase price		No additional estate Purchase price		Additional estate of +20% Purchase price	
Time	10%	20%	10%	20%	10%	20%
1991	93·4	100·0	100·0	100·0	100·0	100·0
1993	80·9	96·9	100·0	100·0	100·0	100·0
1995	73·9	91·9	100·0	100·0	100·0	100·0
1997	68·7	90·0	100·0	100·0	100·0	100·0
1999	63·0	88·7	98·7	100·0	100·0	100·0
2001	57·3	88·9	98·8	100·0	100·0	100·0
2003	51·3	90·9	100·0	100·0	100·0	100·0
2005	44·0	95·6	100·0	100·0	100·0	100·0
2007	33·3	100·0	100·0	100·0	100·0	100·0
2009	17·3	100·0	100·0	100·0	100·0	100·0
2011	0·0	100·0	100·0	100·0	100·0	100·0
2013	0·0	100·0	100·0	100·0	100·0	100·0
2015	n/a	n/a	n/a	n/a	n/a	n/a

Table 25

Percentage in equities
(Purchase price shown as percentage of asset shares)
Office PCL-2

	Estate deficit of 20% Purchase price		No additional estate Purchase price		Additional estate of +20% Purchase price	
Time	*10%*	*20%*	*10%*	*20%*	*10%*	*20%*
1991	100·0	100·0	100·0	100·0	100·0	100·0
1993	100·0	100·0	100·0	100·0	100·0	100·0
1995	100·0	100·0	100·0	100·0	100·0	100·0
1997	100·0	100·0	100·0	100·0	100·0	100·0
1999	96·6	100·0	100·0	100·0	100·0	100·0
2001	93·6	100·0	100·0	100·0	100·0	100·0
2003	92·1	100·0	100·0	100·0	100·0	100·0
2005	92·8	100·0	100·0	100·0	100·0	100·0
2007	99·6	100·0	100·0	100·0	100·0	100·0
2009	100·0	100·0	100·0	100·0	100·0	100·0
2011	100·0	100·0	100·0	100·0	100·0	100·0
2013	100·0	100·0	100·0	100·0	100·0	100·0
2015	n/a	n/a	n/a	n/a	n/a	n/a

Tables 26 and 27 show the corresponding A/L ratios.

Comparing Table 24 with Table 9 and Table 26 with Table 11, it appears that a price of 10% of the asset shares has only a small effect on the investment freedom or the financial strength in Office PCL-25, while a price of 20% of the asset shares offers a substantial improvement over the mutual closed fund option.

Comparing Table 25 with Table 9 and Table 27 with Table 11, it appears that a purchase price of 10% or more of the asset shares gives much greater investment freedom to Office PCL-2 with an estate deficit, or greater security in Office PCL-2 without an estate deficit.

Where there is a 20% additional estate, the policyholders would only gain by part of it being distributed, since there is already sufficient strength and investment freedom in the mutual closed fund. Equivalently, part of the purchase price might be in the form of a "sweetener" used to enhance the asset shares of the policyholders, or to fund a special bonus declaration. Tables 24 and 27, along with Tables 28-31, give an indication of the scope for such distributions, but we have not explored this question further.

The extra support given by the purchase price will be eroded over time by the transfers made to shareholders. However, Tables 24-27 show that, for the stated purchase prices, on the whole, the policyholders still benefit. This assumes stable investment conditions; the closed mutual fund was shown in Section 6.4 to be vulnerable to investment shocks, and Tables 28-31 show for comparison the effects of two investment shocks on the demutualised closed fund.

Table 26

A/L Ratios
(Purchase price shown as percentage of asset shares)
Office PCL-25

| | Estate deficit of 20% | | No additional estate | | Additional estate of +20% | |
| | Purchase price | | Purchase price | | Purchase price | |
Time	*10%*	*20%*	*10%*	*20%*	*10%*	*20%*
1991	1·150	1·218	1·328	1·444	1·560	1·677
1993	1·150	1·150	1·211	1·312	1·413	1·514
1995	1·150	1·150	1·165	1·260	1·354	1·449
1997	1·150	1·150	1·150	1·244	1·338	1·432
1999	1·150	1·150	1·150	1·238	1·333	1·429
2001	1·150	1·150	1·150	1·244	1·344	1·444
2003	1·150	1·150	1·153	1·261	1·367	1·474
2005	1·150	1·150	1·169	1·286	1·403	1·519
2007	1·150	1·165	1·185	1·318	1·450	1·582
2009	1·150	1·210	1·203	1·363	1·522	1·681
2011	1·124	1·276	1·211	1·426	1·640	1·854
2013	1·034	1·410	1·179	1·556	1·931	2·307
2015	n/a	n/a	n/a	n/a	n/a	n/a

Table 27

A/L Ratios
(Purchase price shown as percentage of asset shares)
Office PCL-2

Time	Estate deficit of 20% Purchase price		No additional estate Purchase price		Additional estate of +20% Purchase price	
	10%	*20%*	*10%*	*20%*	*10%*	*20%*
1991	1·252	1·395	1·521	1·663	1·806	1·948
1993	1·197	1·340	1·438	1·582	1·727	1·869
1995	1·167	1·317	1·389	1·539	1·689	1·839
1997	1·152	1·314	1·360	1·522	1·684	1·846
1999	1·150	1·312	1·328	1·506	1·684	1·862
2001	1·150	1·327	1·307	1·509	1·712	1·914
2003	1·150	1·366	1·295	1·535	1·776	2·016
2005	1·150	1·431	1·291	1·588	1·884	2·180
2007	1·150	1·554	1·299	1·692	2·084	2·477
2009	1·207	1·778	1·330	1·889	2·448	3·007
2011	1·314	2·219	1·382	2·276	3·170	4·064
2013	1·592	3·487	1·501	3·385	5·269	7·152
2015	n/a	n/a	n/a	n/a	n/a	n/a

Tables 28 and 29 show the effect of a 25% fall in share prices over 1991 (i.e. the "Scenario 1" described in Section 6.4).

Table 28

25% fall in share prices in 1991
Percentage in equities
(Purchase price shown as percentage of asset shares)
Office PCL-25

Time	Estate deficit of 20% Purchase price 10%	20%	No additional estate Purchase price 10%	20%	Additional estate of +20% Purchase price 10%	20%
1991	93·4	100·0	100·0	100·0	100·0	100·0
1993	29·1	45·0	59·9	74·8	87·3	98·1
1995	21·1	38·9	53·1	70·2	84·6	95·9
1997	14·9	35·2	48·9	68·1	84·4	97·2
1999	6·2	30·2	43·6	66·0	84·7	100·0
2001	0·0	24·9	38·0	64·9	87·2	100·0
2003	0·0	18·9	31·5	64·9	92·2	100·0
2005	0·0	10·5	23·0	65·8	100·0	100·0
2007	0·0	0·0	11·1	69·2	100·0	100·0
2009	0·0	0·0	0·0	78·5	100·0	100·0
2011	0·0	0·0	0·0	99·4	100·0	100·0
2013	0·0	22·1	0·0	100·0	100·0	100·0
2015	n/a	n/a	n/a	n/a	n/a	n/a

Table 29

25% fall in share prices in 1991
Percentage in equities
(Purchase price shown as percentage of asset shares)
Office PCL-2

Time	Estate deficit of 20% Purchase price		No additional estate Purchase price		Additional estate of +20% Purchase price	
	10%	*20%*	*10%*	*20%*	*10%*	*20%*
1991	100·0	100·0	100·0	100·0	100·0	100·0
1993	39·8	68·1	84·0	100·0	100·0	100·0
1995	29·3	64·0	78·8	100·0	100·0	100·0
1997	19·1	59·9	74·8	100·0	100·0	100·0
1999	4·0	61·0	68·5	100·0	100·0	100·0
2001	0·0	68·4	62·9	100·0	100·0	100·0
2003	0·0	85·1	58·8	100·0	100·0	100·0
2005	0·0	100·0	56·1	100·0	100·0	100·0
2007	0·0	100·0	58·4	100·0	100·0	100·0
2009	0·0	100·0	70·5	100·0	100·0	100·0
2011	0·0	100·0	97·6	100·0	100·0	100·0
2013	100·0	100·0	100·0	100·0	100·0	100·0
2015	n/a	n/a	n/a	n/a	n/a	n/a

Comparing these with the closed funds CL-25 and CL-2 in Table 12 shows that the purchase price of 10% of the asset shares only improves matters slightly, whereas the price of 20% of the asset shares offers substantial protection, especially in Office PCL-2. Again, Office PCL-25 shows less sensitivity to additional capital because of the cashflows from its bulge of mortgage business. The additional estate of 20% cannot be compared with Table 11, since it is here assumed to be retained rather than distributed, and much of the additional strength derives from this.

Tables 30 and 31 show the effect of a 25% fall in share prices over 2001 (i.e. the "Scenario 2" described in Section 6.4

Comparison with the closed funds CL-25 and CL-2 in Table 13 shows a much more distinct difference between the two offices. In PCL-25, the protection given by the purchase price of 20% of the asset shares can be seen to be much reduced compared with 10 years previously. This is due to a combination of the transfers to shareholders and the "flywheel" effect of the mortgage business. In PCL-2, which lacks the bulge of mortgage business, the protection given by the purchase price of 10% of the asset shares has all but disappeared, whereas the purchase price of 20% of the asset shares is still a very effective cushion.

In conclusion, the with-profit policyholders might enjoy better security in the short and medium term if their fund were closed within a demutualised office, provided that sufficient assets were allocated to them. The security would be eroded over time by the transfers to shareholders, and the purchase price would have to be large enough to allow for this. However, the cashflows arising from the new business written before closure would largely determine the effective protection given by the purchase price in the longer term.

An office with an additional estate might face a choice between closing the fund and distributing the surplus assets, with some vulnerability to investment conditions in future, or of demutualising and closing the fund, accepting greater security in return for the ultimate loss of some of the surplus assets which make up the additional estate. It may decide that the latter course is more in line with policyholders' needs and expectations.

Table 30

25% fall in share prices in 2001
Percentage in equities
(Purchase price shown as percentage of asset shares)
Office PCL-25

| | Estate deficit of 20% | | No additional estate | | Additional estate of +20% | |
| | Purchase price | | Purchase price | | Purchase price | |
Time	*10%*	*20%*	*10%*	*20%*	*10%*	*20%*
1991	93·4	100·0	100·0	100·0	100·0	100·0
1993	80·9	96·9	100·0	100·0	100·0	100·0
1995	73·9	91·9	100·0	100·0	100·0	100·0
1997	69·0	90·0	100·0	100·0	100·0	100·0
1999	63·0	88·7	98·7	100·0	100·0	100·0
2001	57·3	88·9	98·8	100·0	100·0	100·0
2003	0·0	8·5	9·4	36·5	60·9	81·9
2005	0·0	0·0	0·0	29·6	61·8	89·3
2007	0·0	0·0	0·0	21·1	66·0	100·0
2009	*	0·0	0·0	12·0	79·0	100·0
2011	*	0·0	*	5·3	100·0	100·0
2013	*	0·0	*	29·4	100·0	100·0
2015	n/a	n/a	n/a	n/a	n/a	n/a

* Denotes an office which has an A/L ratio of less than 1.0. Note that the A/L ratio includes a mismatching reserve.

Table 31

25% fall in share prices in 2001, Percentage in equities
(Purchase price shown as percentage of asset shares)
Office PCL-2

| | Estate deficit of 20% | | No additional estate | | Additional estate of +20% | |
| | Purchase price | | Purchase price | | Purchase price | |
Time	*10%*	*20%*	*10%*	*20%*	*10%*	*20%*
1991	100·0	100·0	100·0	100·0	100·0	100·0
1993	100·0	100·0	100·0	100·0	100·0	100·0
1995	100·0	100·0	100·0	100·0	100·0	100·0
1997	100·0	100·0	100·0	100·0	100·0	100·0
1999	96·6	100·0	100·0	100·0	100·0	100·0
2001	93·6	100·0	100·0	100·0	100·0	100·0
2003	0·0	50·1	31·7	90·4	100·0	100·0
2005	0·0	58·7	16·8	100·0	100·0	100·0
2007	0·0	85·6	2·3	100·0	100·0	100·0
2009	0·0	100·0	0·0	100·0	100·0	100·0
2011	0·0	100·0	0·0	100·0	100·0	100·0
2013	0·0	100·0	47·0	100·0	100·0	100·0
2015	n/a	n/a	n/a	n/a	n/a	n/a

6.9 *Postscript*

All of our conclusions have to be taken for what they are; based on results from a simple model of an office writing nothing but 25-year endowments. We would have liked to do much more, given time and space. The modelling which we did raised many interesting questions, and we could only explore a few of them. Nevertheless, they are interesting, and we hope that our description of the modelling has indicated where further worthwhile research may be done.

7.0   SUMMARY AND CONCLUSION

7.1   In Section 2, we considered the background which might lead a mutual life office to consider restructuring. We looked back to the roots of mutuals and examined the possible raison d'etre of a life office. We concluded that the management of a mutual life office should have a clear idea of its current philosophy especially at the time of a restructuring; this should help guide the decision-taking when considering the options available. Reassessment of a mutual life office's philosophy might itself lead management to consider restructuring even if the office were strong and vital. (Sections 2 and 4.8)

7.2   The reasonable expectations of policyholders must be the overriding guiding factor when considering restructuring. We do not believe that it is clear-cut that meeting the policyholders' reasonable expectations necessarily entails aiming to pay out to them at least as much as they would have received had any additional estate been distributed amongst them. However it must also be borne in mind that the policyholders may vote for an alternative scheme of restructuring should they perceive it as being more in their interests (Section 2.11). At various stages in our modelling, in Section 6, different philosophies were adopted, and it was demonstrated that, even if the additional estate (defined in Section 4.4) is not used *directly* to increase the pay-outs to existing policyholders, they might benefit from restructuring.

7.3   We observed at the end of Section 3.5 that fuller disclosure is particularly relevant at the time of restructuring. Giving details of proposed methods and quantifying asset shares at the time of demutualisation, together with the duty of the demutualised office's Appointed Actuary to safeguard policyholders' reasonable expectations (which would become better defined by the disclosure of such information), should ensure that the interests of existing policyholders are well protected.

7.4   In Section 4.5, we described the "flywheel effect" whereby an office which has expanded rapidly, on returning to a steadier rate of expansion, can be dominated by the premium income from the recently written business for many years. This result is of course not restricted to mutuals which restructure and merely highlights the need for the actuary to project forward the progress of the office and avoid being faced with the impossible task of making a sudden change in direction. In the case of demutualisation, the potential for profits from future business will be important to the purchaser. Clearly the policyholders of a mutual office which has recently succeeded in expanding its new business base can hope to extract a higher price (as a proportion of current assets) in respect of the opportunity to profit from new business. (Section 6.6)

7.5   In Section 6.2 it was demonstrated that an office with an estate deficit (defined in Section 4.6) can reduce the relative size and effect of this deficit if it continues

writing new business. Should such an office close, the estate deficit would be uncovered and it would become impossible to pay full asset shares to the existing policyholders. (Section 6.3)

7.6   Given our chosen parameters and dynamic investment strategy, the constraints on investment in a closed mutual were rather less than we had expected. Even when we incorporated quite severe investment shocks (over and above the in-built solvency margin and mismatching tests), it was not evident that a closed fund must constrain its investment strategy on a contingency basis. It could pursue a more ambitious strategy *until* a shock occurred, although subsequent investment freedom might be more limited than in a continuing mutual. (Points (1) and (2) preceding Table 14 in Section 6.4)

7.7   We would expect a closed fund to be particularly sensitive to the profile of the office at the time of closure, so it may be dangerous to generalise our results; indeed we would suggest that the robustness of a closed fund should be extensively modelled whenever the option is considered.

7.8   Except for any "sweetener", the principal financial advantage for policyholders from demutualisation arises from improved investment freedom (or higher guarantees for the same investment freedom). The actual worth of this greater freedom is clearly dependent on the relative performance of equities and gilts and in our modelling we have sought to highlight this.

7.9   If the existing policyholders are likely to be affected by restricted investment freedom were no restructuring to take place, they might choose to give up a proportion of their asset shares and/or allow any additional estate to be passed ultimately to shareholders. This would be in exchange for access to shareholder capital and the resultant investment freedom allowing the possibility of larger payouts. (Sections 4.7 and 6.8)

7.10   Apart from the receipt of assets given up by policyholders as described in Section 7.9, the purchaser is unlikely to be attracted to the scheme by gains from the existing business alone. The purchaser is more likely to be aiming to profit from business written in the future. The purchaser's assessment of scope for profits from this latter source will limit the size of the "sweetener" which the policyholders can obtain. (Section 6.6)

7.11   In the context of a demutualisation, the existing policyholders could expect to benefit in exchange for profits from any new business which would have been written had there been no injection of capital and no change in distribution channels. The benefit may take the form of merely increased investment freedom or security, or of an explicit "sweetener". The existing policyholders would find it more difficult to argue that they

should benefit from additional new business which can *only* be written if further capital is injected. The same can be said of any new business which can be written through new distribution channels opened by the purchaser. (Section 6.6)

7.12   The value placed on the profits from writing new business following restructuring is highly sensitive to the assumptions made (Section 6.6). This makes it particularly important for the prospective purchaser also to consider whether or not there will be sufficient working capital to support the new business plans and retain the ability to pursue a competitive investment strategy for with profits business. (Section 6.7)

7.13   We would not claim that the simulation results in Section 6 are of global application, but they illustrate some of the investigations which can be appropriate. We see a need for extensive modelling when considering restructuring options, taking into account the particular circumstances applicable in any actual case.

8.   ACKNOWLEDGEMENTS

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APPENDIX 1

Year	Rate of Retail Price Inflation	Gross Dividend Yield	Rate of Increase in Equity Prices	Gross Redemption Yield on Gilts
BARCLAYS DE ZOETE WEDD INDICES				
1949	2.9%	5.0%	−10.3%	3.5%
1950	2.5%	5.0%	5.6%	3.5%
1951	12.2%	5.4%	3.0%	4.0%
1952	3.0%	6.1%	−5.9%	4.2%
1953	0.2%	5.4%	17.8%	3.9%
1954	3.3%	4.4%	42.4%	3.8%
1955	5.1%	4.8%	5.8%	4.4%
1956	2.2%	5.7%	−13.9%	4.7%
1957	4.3%	6.3%	−7.0%	5.3%
1958	1.6%	4.8%	41.1%	4.8%
1959	NIL	3.6%	49.5%	5.0%
1960	1.8%	4.5%	−2.6%	5.6%
1961	3.8%	4.8%	−3.0%	6.5%
1962	2.3%	5.0%	−4.4%	5.4%
1963	1.9%	4.1%	14.8%	5.5%
1964	4.8%	5.2%	−10.6%	6.1%
1965	4.6%	5.2%	6.8%	6.2%
1966	3.7%	5.9%	−10.8%	6.4%
1967	2.4%	4.2%	32.5%	6.9%
1968	5.9%	3.4%	37.0%	7.6%
1969	4.8%	4.0%	−15.1%	8.5%
1970	7.8%	4.6%	−6.2%	9.3%
1971	9.0%	3.4%	40.5%	8.3%
1972	7.6%	3.1%	18.1%	9.6%
1973	10.6%	4.4%	−34.9%	11.9%
1974	19.2%	11.8%	−54.7%	17.0%
1975	24.9%	5.7%	136.1%	14.8%
1976	15.1%	7.4%	−7.9%	15.0%
1977	12.1%	5.4%	49.1%	10.9%
1978	8.4%	5.6%	6.1%	13.2%
1979	17.2%	6.8%	2.7%	14.7%
1980	15.1%	5.8%	26.7%	13.9%
1981	12.0%	5.9%	6.0%	15.8%
1982	5.4%	5.2%	22.4%	11.1%
1983	5.3%	4.7%	22.7%	10.5%
1984	4.6%	4.5%	24.2%	10.6%
1985	5.7%	4.2%	16.7%	10.5%
1986	3.7%	4.1%	21.4%	10.5%
1987	3.7%	4.4%	3.8%	9.5%

APPENDIX 2

THE DEMUTUALISATION OF FS

The circumstances and considerations which led up to the demutualisation of FS Assurance Ltd and its acquisition by Britannia Building Society are well described by P V Burdon in his paper to the Liege Symposium in September 1990 (reference 3). Rather than repeat what he has already written, it is the intention of this Appendix to describe in some detail the principles which guided the drawing up of the financial arrangements of the Scheme. While it should be noted that none of the following constitutes new material, but is rather a summary drawn from the various reports produced prior to the final decision to demutualise being taken, it is hoped that these notes will form a useful reference, showing as they do how the principles mentioned earlier in this paper were applied in practice.

One of the aims of those drawing up the details of this Scheme was that the demutualised office would have the same appearance as if it had always been a proprietary company. In other words, the intention was that the arrangements would not result in the setting up of separate business funds for pre- and post- demutualisation business, but that it would be possible for the same rates of reversionary bonus to be declared on business issued after the restructuring as on business issued before. Of course, an obvious consequence of this approach is the possibility of a discontinuity in the terminal bonus scales declared by the company in the future (in order to achieve equity between the two groups of policyholders since it was agreed that existing with profits FS policyholders would receive maturity payouts which were based on asset shares calculated ignoring the cost of any transfers to shareholders ie. be treated as if still members of a mutual fund). It is also worth noting in passing that the desire for administrative simplicity immediately after the demutualisation does not remove from Britannia Life the option, available to any life company, of closing one with profit fund to new business and opening another.

The problem facing those drawing up the Scheme was how to satisfy this aim while, at the same time, ensuring that the reasonable expectations of the with profits policy-holders of FS were (at least) maintained. While it would have been possible to only allow shareholders to share in the surplus generated by the new business written after the demutualisation, such a choice would not have resulted in the injection of as much capital as that received if the policyholders were to receive a share of the future surplus generated by the existing business of FS.

The decision was therefore taken to adopt the latter approach and so a method had to be found to compensate the existing with profit policyholders for this loss. In addition, these policyholders had also to be compensated for their loss of voting rights and hence

their control of the company. The price agreed with Britannia Building Society was made up of two separate figures, the first (£12.25 million) in respect of the loss of surplus and the second (£1.75 million) in return for the transfer of voting rights along with the "goodwill" of the company.

The latter figure was basically the result of commercial negotiation between the two sides and so, for our purposes, nothing more need be said about the making of this decision.

The first step in the calculation of the former figure was to use a series of bonus reserve valuations to identify what uniform rate of reversionary bonus was supportable over the lifetime of the in force business by all the assets. The assumptions used are described in an appendix to the report produced by the FS Appointed Actuary and constituted realistic expectations as to future experience. Interestingly enough, the expense assumptions used were lighter than those then being experienced by the fund but slightly heavier than those thought to be achievable if reasonable volumes of new business were to be written in the future.

The assets were taken at their market values and it should be noted that all the free assets of FS (£8.85 million on the basis of a bonus reserve valuation which allowed for the continuation of reversionary bonuses at the existing rates) were included in the calculation. It must be stressed that this did not imply that policyholders could automatically expect to receive a run-off of these free assets in the future. Such a distribution would have been inconsistent with the view being taken of FS as a continuing entity. Instead, it was an attempt to equate what might happen were the fund to close at some later date with what was likely to happen in the situation being anticipated of the company continuing in existence.

The value of the shareholders' interest in future surplus could then have been calculated as the present value of one ninth (see later) of the cost of declaring reversionary bonuses at this uniform rate (on whatever published valuation basis was considered appropriate).

However, it was assumed that, in practice, lower rates of reversionary bonus would be declared and that terminal bonuses would be used to bring maturity values up to the level they would have been had the uniform reversionary bonus been in operation. Thus, the next stage in the calculations was, for each year in the future, to calculate the cost of the resulting reversionary bonus and terminal bonus declarations (with the former being based an appropriate net premium valuation). Of course, the resulting stream of bonus costs would only be the amounts required to meet the assumed liabilities to policyholders. If the same level of payout was to be maintained while, in addition, a tenth of the declared surplus was passed to shareholders, then the surplus declared in any year

would need to be 10/9 times the equivalent figure calculated as above. However, for the purposes of putting a figure on the amount to be paid to shareholders in any one year, such an adjustment is not necessary since it is equivalent just to take one ninth of the emerging bonus costs calculated above.

While a certain element of negotiation probably went into the choice of some of the basis assumptions mentioned above, it was certainly the case that the choice of discount rate to be used in valuing the shareholders' receipts was the result of much discussion. As is only to be expected, the precise details of the negotiations are confidential and cannot be revealed here. However, the Appointed Actuary to FS did state what rate was finally agreed upon, namely 12.5% per annum.

The calculation of this present value was not the final stage of the process. Allowance still had to be made for the fact that the addition of this part of the purchase price to the funds of the company could be expected to result in higher future profits than those anticipated in its calculation. An adjustment was therefore applied which increased the figure to the amount (£12.25m) previously quoted.

As is probably common knowledge, the stated goodwill payment of £1.75 million was used to finance a special bonus (of five per cent of attaching bonuses) for all in force FS policies at the date of transfer. This was a genuine increase in benefits since the increase in bonuses was reflected in the underlying asset shares as at 31 December 1989. (It is interesting to note, in passing, that these asset shares were those after an adjustment was made as at 31 December 1988 at the request of the Independent Actuary in order that the total of all the asset shares in force would be at least equal to the aggregate bonus reserve valuation reserves on the assumption of the maintenance of current reversionary bonus rates). The £12.25 million was not to be distributed immediately to policyholders. Instead it was to be used, along with the £1 million received in respect of the sale of half of FS unit trust subsidiary to Britannia Building Society, to increase the free reserves/ working capital of the new proprietary company. The plan was that it would be released gradually, over time, in amounts equal to one ninth of the cost of bonus to policyholders each year. One way of looking at this is to think of the £12.25 million being used to make up policyholders' maturity amounts to those which would have applied had transfers to shareholders not taken place. Alternatively, one can take the view that these monies will be used to meet the cost of the distributions to shareholders in the future.

The Scheme put forward by the directors of FS was seen, not only to compensate policyholders for what they were losing through the arrangement, but also to offer the potential for real gains in the form of lower expenses (on account of scale economies) and better investment returns (thanks to the investment freedom which, it was expected, the payment from Britannia Building Society would make possible). It was considered that such advantages would not have accompanied either of the closure options which

were available. If FS Assurance had become a closed fund of a new proprietary life office, then the maximum new capital which would have been received would have been £2.75 million (£1.75 million for goodwill and £1 million from the sale of part of the subsidiary company referred to above) and as £1.75 million of this sum would immediately have been needed to support the new reversionary bonus, it is unlikely that the remaining £1 million would have provided the potential for investment freedom given by the £13.25 million in the demutualisation option.

The other closure option which was considered was just to close FS Assurance Ltd to new business and not demutualise at all but run the business off through the closed fund. This possibility was discussed in the additional information from the Board of FS given in the circular sent to all policyholders (pages 27-28) and was also considered in some detail by the Independent Actuary. It was his opinion that such a course of action would not only lose the goodwill (valued at £1.75 million above) but would also result in extra expenses of some £2.5 million (which would have had to be met out of the £8.85 million of free reserves on the published valuation basis). (Furthermore, it goes without saying that the potential benefits in reduced expenses resulting from a growing operation would not have materialised either.) In addition he highlighted the problems of maintaining staff in such a situation. However, perhaps the most significant of the drawbacks he identified was the potential effect on investment returns which the constraints of a closed fund situation would eventually have. Such considerations led him to the view that "the apparent financial benefits to be derived from moving to a closed fund are likely to be substantially offset by the financial costs and other disadvantages that such a move could entail. Considering all the uncertainties involved, FS policyholders are likely to find a more secure and certain future with BLL under this Scheme."

APPENDIX 3

In the case study for London Life's restructuring we acknowledge the assistance offered to the Research Group by W B McBride. With his permission we reproduce below his submission.

"THE LONDON LIFE MERGER WITH AMP

In order to understand the events which led up to the merger of London Life with AMP it is necessary to go back to the mid-1970s and chart the progress of the company over the intervening period. At that time, just under half of London Life's liabilities were in connection with the Universities and Colleges' FSSU Scheme and the company's position was not helped by the decision of the Scheme trustees to move to self-administration. London Life succeeded in directing the resulting surrender values and transfer values into its own managed funds for a limited period, but the loss of premium income meant that a radical reassessment of future strategy was required.

It was decided to use the profits arising from the surrendered policies to fund a programme of general expansion with the aim of replacing the lost premium income within five years. This the company succeeded in doing, due in large part to significant AVC sales. However, the cost of the supporting infrastructure was considerable and the problem of expense control was aggravated further by the difficulties London Life were experiencing in recruiting and keeping good salesmen, which resulted in the introduction of a system of bonus payments to the sales force in the late 1970s.

In the early 80s the company pursued a strategy of cost reduction, product diversification and investment in computer systems, the latter with a view to major entry into the personal pension scheme market.

Although sales grew rapidly, with new premium income increasing by an average 35% p.a. over 1981/86, the more 'modern' image of the company did not gain wide acceptance among the traditional client base and the new business strains were heavy. Moreover, by 1985 with-profits single premium pensions business pure endowments had become the major component of the liabilities. The guaranteed rates of interest under these contracts had varied between 6-6·5% since introduction in the early seventies, while the reversionary bonus rate had risen to $5^1/4$%. The total of $11^3/4$%, when taken against the level of long-term rates of interest then available—in the region of 10·5%—and against the investment policy of holding about 60% of the backing assets in equity/property form, was causing writing up problems. The effect of all of these factors was becoming increasingly evident in the published results.

In the period from February 1986 to November 1987 the premium basis guaranteed rate of interest was reduced in stages to 3·5%.

Following Black Monday, the Directors authorised measures to be taken with a view to maintaining the reasonable expectations of with profits policyholders while protecting the continuing viability of the business. Accordingly London Life cut back on new business expansion plans and reduced staffing at Head Office and in the Branches; increased the weighting of the investment portfolio in favour of fixed interest securities to give increased protection to the fund against the risk of a further fall in equity prices; and made cuts in terminal bonus rates. The bonus rate under the reversionary bonus system was later reduced in the light of a reduced expected future level of long-term interest rates. Subsequently the actuary was able to sign his normal valuation certificate and to advise the Board that the office was capable of continuing to trade independently and of meeting the reasonable expectations of its policyholders. He concluded, however, that from the viewpoint of the level of the published free reserves which, at 3·4% of the admissible assets (ignoring implicit items), were historically low, it would be more in the interests of policyholders for a merger on suitable terms to be arranged with a suitable partner than for the office to continue to operate independently.

Discussions were held with upwards of 15 companies and financial institutions from the UK and other countries, but by the time of the Annual General Meeting in May 1988 only two contenders, Equitable Life and AMP, were still in the running. Although both were mutuals with the same essential characteristics as London Life their proposals were significantly different. Equitable offered, in effect, to accept transfer of the break-up value of the business. The sales force would be disbanded, the branches closed, and the Head Office administration integrated with that of Equitable's. Assets would be merged in a common pool, and bonus rates in respect of pre-merger London Life benefits would be linked by formulae to Equitable bonus rates.

The difference in the merger proposal from AMP arose from it being an overseas life office. London Life would remain open for new business as a separate sub-fund of the main AMP Life Fund. Assets would remain segregated and bonuses would relate to the sub-fund's separate experience. Capital support for the writing of new business, for increased investment in equities, for smoothing and solvency purposes would be provided by being a component part of a large and strong life fund. Effectively, therefore, London Life would be retaining all the characteristics it possessed while independent, including the goodwill of the business, but with greatly renewed financial strength. A proposal to merge with AMP was therefore recommended, with a report commissioned on the relative merits of merger and closing the fund to new business. The merger took effect, after Court hearings, with effect from 31st March 1989.

The merger document sent to policyholders had discussed the alternatives of closure of the fund and of merger with Equitable. The greater security and investment freedom which AMP offered, coupled with the ability to realise the full growth potential with accompanying unit cost reductions were, in the directors' opinion, the deciding factors

against the alternatives. After merger the sub-fund operates, in effect, as a separate business inside the AMP Group with its own segregated assets and with bonuses determined in accordance with its own experience. It is administered by a service company, London Life Limited, to whom the former staff transferred. Capital support is available for the purposes described above on the same principles as those on which support would be provided to other sub-funds making up the total membership, i.e. no distinction is made in this respect between policies written in the London Life sub-fund and those written in the Australian sub-funds. The fact that in each case bonuses are determined in accordance with the separate experience does not detract from the aggregate mutuality. There is, in other words, after the merger only one (aggregate) estate sheltering the operations of all of the sub-funds on an equitable basis.

From the perspective of the AMP with-profit policyholders the merger effectively represented the entry of a large block of self-financing new business, on a scale many times greater than that of the existing AMP UK sub-fund, with the prospect for investment of capital in financing the profitable growth of London Life with consequential benefits to all AMP policyholders. Joining the two funds together enabled risks to be shared more widely and afforded complementary advantages to each side. On the one hand, London Life had the capacity to process substantial new business but insufficient free reserves to support a policy of expansion. On the other, AMP had substantial capital resources but limited scope in Australia to deploy them in new business growth. As part of what was seen to be the equitable balancing of advantage between the two sets of with-profit policyholders a £15m transfer was made to the London Life Fund which, in large part, enabled the declaration of a special bonus to transferring policyholders. This transfer was not a loan, nor some form of capital financing: instead it represents the discounted value of that part of the profits emerging in the future through the joint operation which it was deemed would equitably belong to the London Life policyholders. Moreover, the Special Bonus does not represent an asset share conversion from (future) terminal to reversionary bonus form but distribution of the £15m transfer together with a release to surplus from the London Life estate (or, in other words, a release of contingency margins in the London Life Fund no longer required as a result of the merger).

The long-drawn out merger process, attended by Press comment largely of the sensational kind, caused damage to the company's reputation. Turnover, of head office and sales staff, was high and new business in 1989 fell heavily. A strong recovery occurred in 1990 with new premiums 80% greater than those of the previous year."

APPENDIX 4

THE NATIONAL MUTUAL LIFE ASSOCIATION OF AUSTRALASIA

The company's first attempt to demutualise, which would have given the ANZ Bank a 51% shareholding, was called off in May 1990 by order of the Australian government. NMLA came up with a second plan in August 1990, also involving a partial demutualisation but this time to be effected by a placing of shares "as and when appropriate" with a limited number of institutions (of which ANZ was named as one). This summary is based on an Information Memorandum issued to NMLA policyholders at the time of the second plan.

NMLA is to be converted from a company limited by a guarantee to a company limited both by shares and by guarantee, by amendment of the Memorandum and Articles of Association which (in their revised form) empower the Board to issue shares from time to time subject to certain safeguards as summarised below.

(1)   Policyholders, including new policyholders, continue to be members of NMLA with the same individual voting rights as before, including the number of votes, and the proportion of the total votes to which shareholders will be entitled is subject to an upper limit (25% initially) approved by policyholders in general meeting.

(2)   The upper limit to the shareholders' proportion of the total vote will apply to votes cast at a meeting.

(3)   The total votes cast by a single shareholder (including its associates) will not exceed 10%.

(4)   Changes to the plan will require a 75% majority vote overall and a simple majority of each of policyholders and shareholders.

(5)   No one shareholder may acquire more than 20% of the shares on issue unless approved by members.

(6)   There will be 3 non-executive Directors (the current Board numbers 13) who are neither NMLA employees nor employees or directors of any shareholder.

Capital raised through issue of shares will be credited initially to the Shareholders' Fund, from which money may from time to time be allocated to 4 reserves, viz.

the Interest Equalisation Reserve, ("IER")

the Shareholder Capital Reserve, ("SCR")

the Policyholder Capital Reserve, ("PCR"), and

the Future Benefits and Capital Reserve, ("FBCR").

Other than the SCR, these reserves are for the ultimate benefit of the policyholders. The PCR is effectively the capital attributed to policyholders. The purpose of the IER is to smooth out fluctuations in investment returns, and the purpose of the FBCR is to act as a "holding account" for the policyholders, eg. it may be used for bonuses in excess of investment credits, additional benefits for policyholders and certain extraordinary events such as a change in valuation basis. Initially, the PCR will contain all the policyholders' capital and both the IER and the FBCR will be built up from zero over time.

Each year the Directors will determine an Adjusted Earnings Rate ("AER") by adjusting the investment return earned on the assets for any realised and unrealised profits and losses, taxes, investment expenses, and revaluation, etc. The Directors then determine bonuses on the participating policies such as to reflect an investment return of not less than the AER for the assets supporting each block of policies less a deduction of not more than 1·5%. The statutory profits remaining after distribution of this investment credit is then divided between policyholders and shareholders in the ratio PCR:SCR and added to the PCR and SCR, respectively. Transfers may then be made from the PCR to the FBCR (eg. to provide bonuses in excess of those provided by investment credits) and from the SCR to the Shareholders' Fund (eg. to provide a dividend).

From the policyholders' point of view, the share price for a particular issue is not as relevant as the price the shareholders pay for a share in profits. This is the amount that must be transferred into the SCR to generate the required share of profits for shareholders (which is in the ratio PCR:SCR as described above). The benefits to policyholders arising from the issue of shares will depend in particular on NMLA's profit history and the state of the economy. It is stated that, where an attractive price can be negotiated by the Board, additional amounts may be allocated to the PCR, FBCR and/or IER.

The Information Memorandum includes a report by the NMLA Chief Actuary but, in contrast to the Memorandum issued to policyholders in connection with the first plan, there is no report by the consulting actuaries advising the Board. However, the report by the consulting accountants includes a statement to the effect that the consulting actuaries have reported to them (ie. the accountants) that the plan "provides a fair and reasonable basis for allocating profits . . . provided the shares are appropriately priced, based on, amongst other things, actuarial appraisal values . . .".

NMLA intends to transfer its Irish branch business to a wholly-owned subsidiary, which will require a hearing in the High Court in Ireland.

APPENDIX 5

SUMMARY OF NEW YORK LAW ON DEMUTUALISATION

1. A mutual life insurer may be reorganised into
    (a) an independent stock company
    (b) a stock company the majority or all of which may be acquired by another institution, which may itself be organised for that purpose, or
    (c) a stock company which then merges with another stock company.

2. There must be a Plan of reorganisation, which must
    (a) demonstrate a purpose and specify reasons for the demutualisation,
    (b) be in the best interest of the mutual company and its policyholders,
    (c) be fair and equitable to policyholders,
    (d) provide for enhancement of the company's operations, and
    (e) not substantially lessen competition in any line of business.

3. First Method
   N.B. this method is only appropriate where no additional capital is to be raised.
    (a) The Plan must provide for the distribution to policyholders of
        (i) all stock, or
        (ii) all cash proceeds of the sale of stock, or
        (iii) all proceeds of the public sale of shares of a trust established solely to receive the shares of the reorganised company.
    (b) The allocation of compensation must be determined in the light of the proportion of each policyholders' contribution to the total consideration distributed.
    (c) Participating policies and annuity contracts in force (but possibly excluding experience-rated group contracts) must be operated as a closed block, to which must be allocated sufficient assets to cover projected liabilities and maintain current dividend scales, provided the experience underlying those scales continues.

4. Second Method
    (a) The Plan must provide for participating policies to be operated as a closed block, as under the first method.
    (b) A Policyholders' preference account (see 8. below) must be established.

(c) The reorganised company cannot declare dividends or establish a stock repurchase plan if, as a result, net preference assets (see 9. below) would be less than the preference account.

(d) The total offering price of stock must equal the estimated fair market value of the company.

(e) The total compensation distributed must be equivalent to the sum of

   (i) policyholders' equity (see 7. below),

   (ii) non-transferable pre-emptive subscription rights to all shares,

   (iii) 10% of the net proceeds of the initial stock offering, and

   (iv) the establishment of a preference account.

(f) The compensation distributed may include shares, which may be issued to a designated trust.

5. Third method

   (a) This is a simplified method for insurers with

      (i) surplus less than $50m, and

      (ii) industrial assurance in force.

   (b) The total offering price of stock must equal the estimated fair market value of the company.

   (c) Participating policies must be operated as a closed block, solely for dividend purposes, to which must be allocated sufficient assets to cover statutory reserves and liabilities and to maintain current dividend scales, adjusted as changes in experience warrant.

   (d) Compensation must equal the statutory surplus.

   (e) The allocation of compensation must be fair and equitable, but not necessarily in the light of the proportion of each policyholders' contribution to the total consideration distributed.

6. Any other method approved by the Superintendent as fair and equitable and which provides for the fair and equitable allocation of compensation.

7. Policyholders' equity

   (a) The amount must equal the excess of assets accumulated from participating policies in force over the sum of

      (i) assets allocated to the closed block and

      (ii) statutory reserves and liabilities attributable to any group contracts excluded from the closed block.

(b) The amount must not be less than the amount of the policyholders' preference account, ie. it must be at least 50% of the excess of total admitted assets over the sum of

   (i) assets allocated to the closed block and

   (ii) statutory reserves and liabilities attributable to any group contracts excluded from the closed block.

8. Policyholders' preference account

   (a) The sole function of the account is to establish a priority in the event of a subsequent liquidation of the reorganised company.

   b) The amount must equal the excess of total admitted assets over the sum of

      (i) assets allocated to closed block,

      (ii) policyholders' equity, and

      (iii) statutory reserves and liabilities attributable to any group contracts excluded from the closed block.

9. Net preference assets

   The amount is defined as the excess of total admitted assets over the sum of

   (a) Assets allocated to closed block.

   (b) Statutory reserves and liabilities attributable to any group contracts excluded from the closed block, and

   (c) the reorganised company's net asset value.

10. The reorganised company must establish a market for its shares within 2 years.

11. The Superintendent must appoint one or more qualified and disinterested actuary.

   (a) "qualified" means a Member of the American Academy of Actuaries (MAAA) who is knowledgeable and experienced as to the matters involved.

   (b) "disinterested" does not exclude a policyholder.

   (c) The actuary is only required to certify

      (i) the amount of assets accumulated from participating policies in force and

      (ii) the reasonableness and sufficiency of the asset allocation.

   (d) The actuary's certificate must be accompanied by a memo describing the calculation made and assumptions used.

   (e) The actuary may request access to the company's books and records and any other information.

   (f) The Superintendent is not bound by any findings, conclusions, certifications or recommendations of the actuary.

    (g) Disclosure of the actuary's certificate and memo are at the discretion of the superintendent, but if they are to be made public, they must be made available to the company 15 days beforehand.

12. A public hearing must be held.

13. Approval by policyholders
    (a) Unless otherwise provided in the company's charter or by-laws, voting is on the basis of 1 vote per policyholder irrespective of number or amount of his policies.
    (b) Voting may be in person, by mail or by proxy.
    (c) A majority of two thirds of the votes cast is required.

14. No person or institution may acquire 5% or more of the reorganised company's shares within 5 years of the demutualisation.

APPENDIX 6

SENSITIVITY TESTS

A6.1   *The Scope of the Sensitivity Tests*

As the modelling proceeded, it became obvious to the Group that we were juggling with a large number of possible influences on the progress of our model offices. These sensitivity tests explore the effects of some of these influences. Time and space permit us to consider only a few of the more important factors, namely investment performance, bonus rates new business expansion in an office which continues to trade, and expenses in a closed fund.

We carried out sensitivity testing for the Offices MUT-25 and CL-25, but not for MUT-2 and CL-2 (with the exception of new business growth). This was purely for reasons of space, as this paper was already very long. However, the model office program MO which was used by the Group is widely available, and the Group will make the office data files available to anyone who wishes to explore any aspects of the model offices with which we have not dealt.

In most cases, the important features of the sensitivity tests can be summed up by the proportion invested in equities, and we therefore do not show the relative maturity values or the A/L ratios unless these highlight some feature which is not revealed by the investment split. Recall that if the proportion invested in equities lies between 0% and 100% then the A/L ratio is always 1.15.

A6.2   *Investment Performance*

The assumed investment performance has played a central part in our projections in at least four ways.

(a)   The general level of rates of return has influenced the solvency of the model offices, and hence, albeit indirectly, the investment split between gilts and equities.

(b)   The gap between the rate of return on equities and the rate of return on gilts has influenced the relative maturity values.

(c)   The possibility of investment "shocks" had a significant effect on the security of a closed fund.

(d)   The dividend yield is most important in determining the strength of the statutory minimum valuation basis, and therefore also the investment split between gilts and equities.

We have already examined (c) and (d) in Section 6.4. We have also looked at (b) in Section 6.7, but only from the point of view of new policyholders in a demutualised office. We now look at (a) and (b) in more detail.

Table A1

Percentage in Equities

Offices with –20% additional estate at outset

	Office MUT-25 Change in net rate of rtn.			Office CL-25 Change in net rate of rtn.		
Time	*–1.74%*	*0%*	*+1.69%*	*–1.74%*	*0%*	*+1.69%*
1991	65·0	79·9	86·1	57·5	73·9	81·5
1995	15·7	61·6	79·5	14·5	56·2	75·9
1999	3·6	61·0	82·9	0·0	45·8	80·4
2003	0·0	61·6	88·0	0·0	33·0	89·8
2007	0·0	63·7	94·6	0·0	11·7	100·0
2011	0·0	66·8	100·0	0·0	0·0	100·0
2015	0·0	70·5	100·0	n/a	n/a	n/a

Offices with no additional estate at outset

	Office MUT-25 Change in net rate of rtn.			Office CL-25 Change in net rate of rtn.		
Time	*–1.74%*	*0%*	*+1.69%*	*–1.74%*	*0%*	*+1.69%*
1991	100·0	100·0	100·0	100·0	100·0	100·0
1995	64·4	89·2	98·4	71·2	92·5	100·0
1999	43·7	83·0	97·7	41·5	90·0	100·0
2003	31·9	82·3	100·0	0·0	93·0	100·0
2007	15·3	83·4	100·0	0·0	100·0	100·0
2011	0·0	86·1	100·0	0·0	100·0	100·0
2015	0·0	89·7	100·0	n/a	n/a	n/a

Offices with +20% additional estate at outset

	Office MUT-25 Change in net rate of rtn.			Office CL-25 Change in net rate of rtn.		
Time	*–1.74%*	*0%*	*+1.69%*	*–1.74%*	*0%*	*+1.69%*
1991	100·0	100·0	100·0	100·0	100·0	100·0
1995	99·7	100·0	100·0	100·0	100·0	100·0
1999	74·6	98·9	100·0	87·9	100·0	100·0
2003	61·7	96·4	100·0	67·6	100·0	100·0
2007	46·9	97·5	100·0	34·0	100·0	100·0
2011	32·6	100·0	100·0	0·0	100·0	100·0
2015	20·2	100·0	100·0	n/a	n/a	n/a

A6.2.1   *General Level of Rates of Return*

To represent a change in the general level of rates of return, we increased or decreased by 2% the gross redemption yield on gilts. We then found the resulting change in the net yield on gilts, and made the same change to the rate of increase of share prices (which is untaxed). Thus both gilts and equities were subject to the same change in their net rates of return. The change was assumed to apply throughout the whole projection period. The net changes were +1.69% and –1.74%, resulting from a 2% increase or decrease, respectively, in the gross gilt yield.

We made projections of Offices MUT-25 and CL-25 with additional estates at outset of –20%, 0% and +20% of the asset shares. The proportions invested in equities are shown in Table A1.

These projections do not allow for any changes in the bonus rates which might follow a change in yields, so we do not want to say too much before we have seen the effects of different levels of reversionary bonus. We note, however, that Office CL-25, which appeared to have greater investment freedom than Office MUT-25 provided that the estate was not in deficit, loses that advantage when the rate of return is lower. We should not read too much into this, since a closed fund may have more freedom to reduce bonus rates.

A6.2.2   *The Gap Between Gilt Yields and Equity Yields*

Much of Section 6 was concerned with the benefits of investment freedom, which depended on the difference between the rate of return on gilts and the rate of return on equities. In many ways we are more concerned with this than with the general level of the rate of return, since such changes in conditions would probably be accompanied by changes in bonus rates.

Recall that the investment assumptions in Section 6 were:

gross redemption yields on gilts	9·0%
gross dividend yield	4·5%
rate of increase of share prices	6·0% (untaxed)

We shall call these assumptions "Basis 0". We considered a further 4 sets of assumptions, as follows.

Basis –G

gross redemption yields on gilts	8·0%
gross dividend yield	4·5%
rate of increase of share prices	6·0% (untaxed)

"Basis –G" decreases the general level of rates of return by decreasing the gross gilt yield by 1% (and the net gilt yield by about 0·85%). It therefore widens the gap between gilt returns and equity returns.

Basis –E

gross redemption yields on gilts	9·0%
gross dividend yield	4·5%
rate of increase of share prices	5·15% (untaxed)

"Basis –E" decreases the general level of rates of return by decreasing the rate of increase of share prices by 0·85% (the same as the decrease in the *net* gilts yield in Basis -2) It therefore narrows the gap between gilt returns and equity returns.

Basis +G

gross redemption yields on gilts	10·0%
gross dividend yield	4·5%
rate of increase of share prices	6·0% (untaxed)

"Basis +G" increases the general level of rates of return by increasing the gross gilt yield by 1% (and the net gilt yield by about 0·85%). It therefore narrows the gap between gilt returns and equity returns.

Basis +E

gross redemption yields on gilts	9·0%
gross dividend yield	4·5%
rate of increase of share prices	6·85% (untaxed)

"Basis +E" increases the general level of rates of return by increasing the rate of increase of share prices by 0·85% (the same as the increase in the *net* gilts yield in Basis 1) It therefore widens the gap between gilt returns and equity returns.

We considered both the offices MUT-25 and CL-25. First we looked at these offices with no additional estate. The proportions invested in equities are shown in Table A2.

Table A2

Percentage in equities

Office MUT-25 with no additional estate

Time	Basis –G	Basis –E	Basis 0	Basis +G	Basis +E
1991	100·0	100·0	100·0	100·0	100·0
1995	86·0	84·9	89·2	98·5	100·0
1999	77·2	76·7	83·0	88·2	93·5
2003	75·5	73·3	82·3	85·9	90·8
2007	74·9	71·6	83·4	87·6	95·3
2011	76·7	71·7	86·1	90·6	100·0
2015	79·7	73·1	89·7	93·9	100·0

Office CL-25 with no additional estate

Time	Basis –G	Basis –E	Basis 0	Basis +G	Basis +E
1991	100·0	100·0	100·0	100·0	100·0
1995	90·8	87·2	92·5	93·6	97·6
1999	86·9	78·9	90·0	92·1	100·0
2003	88·1	72·1	93·0	95·5	100·0
2007	99·9	66·4	100·0	100·0	100·0
2011	100·0	66·1	100·0	100·0	100·0
2015	n/a	n/a	n/a	n/a	n/a

We can make the following observations.

(a) If the office is able to invest most of its funds in equities anyway (as is the case in Office CL-25) it is hardly affected by changes in the gilt yield (Bases –G and +G). However, as soon as it has to invest about 10% of its funds in gilts the effect of the change in the gilt yield becomes noticeable; (this is clearly seen in Office MUT-25).

(b) An office which is largely invested in equities is sensitive to the change in equity price growth (Bases –E and +E). Offices MUT-25 and CL-25 both show considerable sensitivity to a reduction in equity price growth; the sensitivity of Office CL-25 in the other direction is constrained.

Table A3 shows the maturity values relative to those in Office MUT-25 on Basis 0 (i.e. on our original assumptions).

Table A3

M.V. as percentage of M.V in continuing mutual on Basis 0.

Office MUT-25 with no additional estate

Time	Basis –G	Basis –E	Basis 0	Basis +G	Basis +E
1991	100·0	99·2	100·0	100·0	100·0
1995	99·8	96·2	100·0	100·1	104·0
1999	98·8	93·5	100·0	100·7	107·3
2003	97·5	91·2	100·0	101·5	110·5
2007	96·2	89·2	100·0	102·2	113·6
2011	95·1	87·9	100·0	102·7	116·2
2015	94·3	87·1	100·0	103·0	117·7

Office CL-25 with no additional estate

Time	Basis –G	Basis –E	Basis 0	Basis +G	Basis +E
1991	99·6	98·8	99·6	99·6	100·3
1995	99·4	95·7	99·5	99·6	103·5
1999	99·3	93·1	100·0	100·5	107·8
2003	99·2	90·8	100·7	101·6	112·4
2007	99·8	88·6	101·9	103·0	116·3
2011	101·1	86·7	102·9	103·9	118·7
2015	102·9	86·9	104·4	105·1	120·5

These tables show the trends which would be expected, given that in many cases the offices are able to invest substantially in equities; under Basis –E the rate of return on equities is lower so the maturity values are lower, and under Basis +E the rate of return on equities is higher so the maturity values are higher too. Even in Office MUT-25, which has the highest level of gilt investment under Basis –G (under which the returns on gilts are reduced) the reduction in the maturity values is not large.

Both offices, with no additional estate, had considerable investment freedom, so the chief arbiter of the outcome was the rate of return on equities. In order to see the effect of our different investment assumptions on an office which had less investment freedom, we projected Offices MUT-25 and CL-25 with a 20% estate deficit on the same four bases as above. The resulting proportions invested in equities and relative maturity values are shown in Tables A4 and A5. Note that the relative maturity values are measured against the maturity values in office MUT-25 with *no* additional estate under Basis 0 (and are therefore directly comparable with Table 4).

Table A4

Percentage in equities

Office MUT-25 with 20% estate deficit

Time	Basis –G	Basis –E	Basis 0	Basis +G	Basis +E
1991	75·6	78·9	79·9	82·7	81·0
1995	49·0	58·1	61·6	69·2	65·3
1999	45·4	56·2	61·0	69·2	66·2
2003	44·4	55·0	61·6	70·9	69·2
2007	42·5	54·9	63·7	74·1	74·1
2011	41·1	55·5	66·8	78·1	80·5
2015	41·1	57·1	70·5	82·0	86·9

Office CL-25 with 20% estate deficit

Time	Basis –G	Basis –E	Basis 0	Basis +G	Basis +E
1991	68·7	72·9	73·9	77·5	75·0
1995	45·2	51·5	56·2	63·3	61·1
1999	24·7	37·2	45·8	57·9	55·4
2003	0·0	19·3	33·0	53·2	50·0
2007	0·0	0·0	11·7	48·0	43·1
2011	0·0	0·0	0·0	42·3	31·4
2015	n/a	n/a	n/a	n/a	n/a

The most interesting feature of Table A4 is that the sensitivity of Office MUT-25 to a lower gilt yield is greater than the sensitivity to a higher gilt yield. This may be an artefact of our bases. The office with the lower gilt yield (Basis –G) suffers in two ways; first, for a given proportion in gilts, the valuation interest rate is lower than it is on Basis 0, so it is forced to invest yet more in gilts; second, by investing more in gilts it not only loses the better returns on the equities it has to sell, but obtains a lower rate of return on gilts (compared with Basis 0) as well. On the other hand, the office with the higher gilt yield (Basis +G) can use the same rate of interest in its statutory minimum valuation as under Basis 0, while investing more in equities, eschewing the relatively higher returns which it could obtain from gilts.

The sensitivity to lower or higher rates of increase of share prices is about the same as on Basis 0. In this case, only the assets are affected. The dividend yield is the same as on Basis 0, so the statutory minimum valuation interest rate is determined using the same yields.

Table A5 shows the results on policyholders' benefits; again the poorest result is obtained under Basis –G, where the office is forced more and more into gilts by low gilt yields. As we have remarked before, the office is forced by the statutory minimum valuation basis to buy dear gilts instead of (possibly) cheap equities.

Table A5

M.V. in MUT-25 with 20% estate deficit as percentage
of M.V in MUT-25 with no additional estate on Basis 0.

Time	Basis −G	Basis −E	Basis 0	Basis +G	Basis +E
1991	99·8	99·0	99·8	99·8	100·5
1995	95·6	94·4	97·3	98·3	100·5
1999	90·8	90·4	95·1	97·6	100·5
2003	86·8	87·2	93·5	97·4	101·1
2007	83·4	84·8	92·4	97·6	102·1
2011	80·7	83·3	91·8	98·1	103·4
2015	78·8	82·7	91·9	98·9	105·1

M.V. in CL-25 with 20% estate deficit as percentage
of M.V in MUT-25 with no additional estate on Basis 0·

Time	Basis -G	Basis -E	Basis 0	Basis +G	Basis +E
1991	89·4	88·8	89·4	89·4	90·1
1995	85·4	84·4	86·9	87·9	89·6
1999	80·3	80·4	84·3	86·9	89·0
2003	73·7	76·4	81·4	86·0	88·1
2007	67·1	72·1	77·8	85·1	86·5
2011	62·0	68·6	73·3	84·0	83·9
2015	59·1	66·8	70·1	84·0	81·3

We could have gone on to test many other combinations of different gilt yields, equity dividend yields and equity price growth. We would surely discover many interesting facts about the effects of the statutory minimum valuation basis, coupled with our dynamic asset allocation algorithm. However, that could take up a paper on its own, and we felt that the results shown above give a feel for the effects of variations in the gap between gilt returns and equity returns.

A6.3   Reversionary Bonus

In Section 6, reversionary bonus was assumed to be as follows:

	Before 1995	After 1994
Bonus on sum assured	2·5%	2·0%
Bonus on bonus	5·0%	4·0%

In our bonus sensitivity tests, we reduced or increased all of these rates by 1%, while keeping investment returns fixed at the levels assumed in Section 6 (and in Basis 0 in Section 7.2 above). The resulting proportions invested in equities in Offices MUT-25 and CL-25 are shown in Table A6.

Table A6

Percentage in Equities

Offices with –20% additional estate at outset

| | Office MUT-25 | | | | Office CL-25 | | |
| | Change in bonus rates | | | | Change in bonus rates | | |
Time	–1%	0%	+1%		–1%	0%	+1%
1991	88·5	79·9	70·2		82·9	73·9	64·9
1995	86·0	61·6	35·2		80·0	56·2	32·2
1999	94·2	61·0	23·3		87·1	45·8	1·5
2003	100·0	61·6	13·1		100·0	33·0	0·0
2007	100·0	63·7	0·0		100·0	11·7	0·0
2011	100·0	66·8	0·0		100·0	0·0	0·0
2015	100·0	70·5	0·0		n/a	n/a	n/a

Offices with no additional estate at outset

| | Office MUT-25 | | | | Office CL-25 | | |
| | Change in bonus rates· | | | | Change in bonus rates· | | |
Time	*–1%*	*0%*	*+1%*		*–1%*	*0%*	*+1%*
1991	100·0	100·0	100·0		100·0	100·0	100·0
1995	100·0	89·2	67·4		100·0	92·5	83·8
1999	100·0	83·0	50·5		100·0	90·0	64·2
2003	100·0	82·3	37·9		100·0	93·0	42·0
2007	100·0	83·4	24·8		100·0	100·0	8·7
2011	100·0	86·1	10·8		100·0	100·0	0·0
2015	100·0	89·7	0·0		n/a	n/a	n/a

Offices with +20% additional estate at outset

| | Office MUT-25 | | | | Office CL-25 | | |
| | Change in bonus rates· | | | | Change in bonus rates· | | |
Time	*–1%*	*0%*	*+1%*		*–1%*	*0%*	*+1%*
1991	100·0	100·0	100·0		100·0	100·0	100·0
1995	100·0	100·0	90·0		100·0	100·0	98·1
1999	100·0	98·9	71·2		100·0	100·0	85·8
2003	100·0	96·4	58·5		100·0	100·0	72·1
2007	100·0	97·5	46·3		100·0	100·0	50·8
2011	100·0	100·0	34·5		100·0	100·0	0·0
2015	100·0	100·0	25·0		n/a	n/a	n/a

The significance of these figures is that they show that changes in reversionary bonus and changes in the general level of investment returns have effects of comparable magnitude but in opposite directions. To some extent, therefore, differences in the level of the rate of return can be coped with by actively managing the bonus rates. We demonstrated in Section 6 that a closed fund, in stable conditions, may have more investment freedom than an office which continues to trade, and these sensitivity tests suggest that this may be true over a reasonable range of investment returns. It should also be borne in mind that if a closed fund were to make investment freedom its main objective, it may be able to cut reversionary bonus rates by more than a trading office could . This is why, in Section 6, we concentrated on the effect of investment "shocks", the effects of which may not be so easily masked by changes in reversionary bonus. Nevertheless, comparison of Table A6 with almost any of the closed fund projections in Section 6 makes it clear that the ability to reduce reversionary bonus rates in a closed fund is a very powerful safeguard of the office's investment freedom.

A6.4   *Rate of Growth of New Business*

In Section 6, we assumed a moderate rate of new business growth of 2% over the rate of inflation. If the office expands at a greater or smaller rate, however, the future pattern of new business strains will be different, with a consequent effect on the office's investment freedom. The rate of new business growth therefore has a bearing on the relative investment freedom of the closed funds. To examine this, we projected Offices MUT-25 and MUT-2 with future new business growth of 3% less than the rate of inflation, and 7% over the rate of inflation (i.e. the new business growth assumed in Section 6 plus or minus 5%). The proportions invested in equities are shown in Table A7.

We make the following observations.

(a)   The results for the offices with no additional estates show that the effect of new business strain is small compared with the effect of the rate of return, or the reversionary bonus. This is not too surprising, since we have assumed that the statutory minimum valuation includes a Zillmer close to the maximum allowed by the Regulations.

(b)   Office MUT-25 with no additional estate is almost completely insensitive to the rate of new business expansion until after the year 2007, which is 17 years after the start of the projection period. Office MUT-2, on the other hand, is affected by the rate of new business growth rather sooner, even though the effects are not very large. The insensitivity of Office MUT-25 is yet another sign of the "flywheel effect" bestowed by the mortgage business taken on before 1990; the cashflows from that business dominate the office to such an extent that different

patterns of new business after 1990 have a much reduced effect in the short and medium term.

(c) For the offices with a 20% estate deficit, less new business makes the office weaker, and more new business has the opposite effect. The reason is that the lower rate of new business growth (RPI-3%) is less than the net rate of return on the assets, so the relative deficit, which "grows" at the investment rate of return, is growing faster than the office's asset shares, which ultimately increase at the same rate as the rate of new business growth. An office with an estate deficit might best be able to reduce it, relative to the fund, by expanding rapidly, although this would not necessarily be a proper course of action.

A6.5 *Expenses in a Closed Fund*

The expense assumptions for the closed funds were described in Section 4.9. Broadly speaking, we assumed that the one-off closure costs amounted to one year's new business expenses excluding commission, and that 10% of the per-policy costs at the time of closure represented overheads which had to be spread over the diminishing number of policies during the run-off. In this section, we examine the effect on the closed offices CL-25 and CL-2 of

(a) one-off closure costs double those above,

(b) renewal expenses after closure of double those in Section 6,

(c) renewal expenses after closure of four times those in Section 6.

Note that (b) and (c) are considerably harsher than doubling or quadrupling the overheads which have to be respread; we are doubling and quadrupling *all* the non-commission renewal expenses.

Since the closed funds with no additional estate usually support 100% equity investment, Table A8 shows the effect on the A/L ratios. Table A9 shows the proportion invested in equities for Office CL-25 only, since the A/L ratio of that office is pegged at 1.15 by the asset allocation strategy during the middle years of the projection.

Neither office is affected much by double the one-off closure costs. Office CL-25 is distinctly more vulnerable than Office CL-2 to higher renewal expenses, but even so the renewal expenses would have to more than double to have a really serious effect. It appears that the costs of closure and the operating costs after closure are much less important than other factors affecting the fund. We emphasise again, that we have assumed double or quadruple the *entire* non-commission renewal expense, and not just that part which may be taken to represent overheads.

Table A7

Percentage in Equities

Offices with -20% additional estate at outset

	Office MUT-25 New Business Growth (+RPI)			Office MUT-2 New Business Growth (+RPI)		
Time	–3%	2%	7%	–3%	2%	7%
1991	79·9	79·9	79·9	93·7	93·7	93·7
1995	60·8	61·6	62·5	66·0	66·4	66·8
1999	58·7	61·0	62·8	32·1	34·9	38·0
2003	57·4	61·6	66·0	0·0	0·0	12·2
2007	57·5	63·7	69·3	0·0	0·0	2·4
2011	58·4	66·8	73·2	0·0	0·0	9·9
2015	59·7	70·5	77·1	0·0	0·0	22·3

Offices with no additional estate at outset

	Office MUT-25 New Business Growth (+RPI)			Office MUT-2 New Business Growth (+RPI)		
Time	–3%	2%	7%	–3%	2%	7%
1991	100·0	100·0	100·0	100·0	100·0	100·0
1995	88·9	89·2	89·5	100·0	100·0	100·0
1999	83·1	83·0	83·2	100·0	100·0	100·0
2003	82·1	82·3	82·2	100·0	99·1	97·4
2007	83·7	83·4	83·4	99·1	95·5	92·6
2011	88·4	86·1	84·9	100·0	96·4	91·6
2015	94·8	89·7	86·7	100·0	98·7	91·7

Offices with +20% additional estate at outset

	Office MUT-25 New Business Growth (+RPI)			Office MUT-2 New Business Growth (+RPI)		
Time	–3%	2%	7%	–3%	2%	7%
1991	100·0	100·0	100·0	100·0	100·0	100·0
1995	100·0	100·0	100·0	100·0	100·0	100·0
1999	99·8	98·9	98·1	100·0	100·0	100·0
2003	98·7	96·4	94·4	100·0	100·0	100·0
2007	100·0	97·5	93·7	100·0	100·0	100·0
2011	100·0	100·0	94·3	100·0	100·0	100·0
2015	100·0	100·0	95·1	100·0	100·0	100·0

Table A8

A/L Ratios

Office CL-25

Time	No Increase	2 × Closure Costs	2 × Renewal Expenses	4 × Renewal Expenses
1991	1·209	1·196	1·209	1·209
1995	1·150	1·150	1·150	1·150
1999	1·150	1·150	1·150	1·150
2003	1·150	1·150	1·150	1·150
2007	1·171	1·156	1·150	1·150
2011	1·253	1·239	1·199	1·150
2015	n/a	n/a	n/a	n/a

Office CL-2

Time	No Increase	2 × Closure Costs	2 × Renewal Expenses	4 × Renewal Expenses
1991	1·385	1·381	1·385	1·385
1995	1·286	1·283	1·278	1·263
1999	1·246	1·242	1·232	1·203
2003	1·229	1·226	1·209	1·168
2007	1·250	1·247	1·222	1·165
2011	1·366	1·362	1·327	1·248
2015	n/a	n/a	n/a	n/a

Table A9

Percentage in equities

Office CL-25

Time	No Increase	2 × Closure Costs	2× Renewal Expenses	4 × Renewal Expenses
1991	100·0	100·0	100·0	100·0
1995	92·5	90·9	90·9	87·7
1999	90·0	88·2	86·7	79·4
2003	93·0	90·3	86·5	72·4
2007	100·0	100·0	93·5	65·8
2011	100·0	100·0	100·0	60·7
2015	n/a	n/a	n/a	n/a