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# BONUS DECLARATIONS AFTER A FALL IN INTEREST RATES

By S. L. Smaller, M.A., F.I.A., F.P.M.I.

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*Myself when young did eagerly frequent*
*Doctor and Saint, and heard great Argument*
*About it and about: but evermore*
*Came out by the same door as in I went.*
Omar Khayyam

## 1. THE BACKGROUND

1.1 On 21 December 1976 I received the following memorandum from Mr A. E. Tinckler, who was then the Actuary of my Company. It read:

1.2. "We have been discussing recently some of the effects on the Life Fund of a significant fall in interest rates, and I think we agree that the time has now come to set up a formal study to analyse the problem and to make recommendations.

1.3. "There is no doubt that interest rates in the United Kingdom are very much higher at the present time than in other comparable countries. There are good reasons for this state of affairs, but it is most unlikely to continue over more than a few years, unless the country is to descend to very low levels indeed in the international league. In spite of many pessimistic assertions to the contrary, there are good grounds for thinking that the present rates will come down very substantially indeed over the next few years.

1.4. "The impact of such a fall, if it occurred, on the Life Fund is made much more difficult to assess by the substantial proportion of the assets invested in equities and property. It certainly could be the case that a fall in interest rates resulted in much improved performance in the variable interest sector, but it is reasonable to assume that a lower general interest base will tend to reduce yields generally on new money, whether that new money is invested in fixed interest or variable interest investments.

1.5. "The classic way to protect the Fund from the effects of a significant fall in interest rates would, of course, be to arrange investments so as to 'immunize'. However, even if this were practically possible, it would place a limit on the volume of new business.

1.6. "However, it must not be forgotten that our expenses have to be covered and that the sales organization cannot be contracted and subsequently expanded, except over a long period.

1.7. "The real nub of the problem appears to be the expectations being generated in the minds of prospective policyholders by the market generally.

However, it would require an Institute paper and much other weight of propaganda over a lengthy period to change things."

1.8. The memorandum went on to suggest possible courses of action including the writing of linked business.

1.9. A study was made but yielded little by way of answers to the questions raised. Later a note was added to illustrations of benefits under with profits business, to the effect that the high rates of bonus declared and used in illustrations were due in the main, to the high rates of interest which had prevailed in recent years which, in turn, were associated with high rates of inflation. If inflation fell to low levels and interest rates followed suit, then it was likely that bonuses would also come down. In such circumstances, the real value of benefits payable was likely to be greater.

1.10. The problem smouldered but did not erupt. Interest rates fell and then rose again. The matter had become less urgent.

1.11. In his paper "The Flock and the Sheep and Other Essays" (*J.I.A.* **108,** 361) the late Frank Redington directed the profession's attention to the future course of its bonus strategy. We did so reluctantly promising ourselves that we would address the problem later. For the moment the sun never shone more brightly.

1.12. I believe that the time to consider the problem has arrived. This paper is addressed as much to the insurance industry as to the profession. The issues involved cover a wide spectrum ranging from the expectations created at the point of sale to the form and presentation of the bonus distribution.

1.13. This paper is intended more as a basis for discussion than as charting a course for the future. The views expressed are my own and do not necessarily represent those of my office.

## 2. DEVELOPMENTS IN BONUS DISTRIBUTIONS

2.1. The financial climate in which bonus declarations have been made since the start of the twentieth century has been described briefly in Redington's paper and I will add only the events which have occurred since then to complete the scene.

2.2. The year 1981 started with gilt yields at 14% and the rate of inflation slightly higher. Gilt yields increased to nearly 16% by the year end and then started to decline to about 11% at the beginning of 1983. During this period there was a progressive decline in inflation to approximately $5\frac{1}{2}$% with the market value of equities increasing by about 44% although in real terms the appreciation was about half that figure.

2.3. Since January 1983, inflation has remained at about the 5% mark and gilt yields have, except for short periods, varied between 10% and 11%. After a strong performance during 1983 and the early part of 1984, equities became unsettled partly as a result of the miners' strike and partly from fears of higher interest rates in the United States. This and lower oil prices resulted in an almost continuous decline in the value of Sterling. Equities recovered during the second half of 1984

as the country came to terms with the continuation of the miners' strike and the danger of fuel shortages receded. Prospects of tax reductions in 1985 with its attendant increase in disposable incomes, coupled with lower interest rates in the U.S.A. and more competitive exports fuelled the recovery of the equity market still further.

2.4. The policy of the Government of controlling the money supply and reducing public expenditure seems likely to succeed in bringing inflation down further and this should, if freed from external influences, result in lower interest rates in the U.K.

2.5. It is perhaps worth recounting briefly the development of bonus systems in the U.K. since the last war. For ordinary participating life assurance business, most offices declared either simple or compound reversionary bonuses. Annual declarations were the exception, most offices declaring biennially, triennially or quinquenially. During this period simple bonuses gave way to compound, and from the late 1950s modified compound bonuses began to emerge in the form of $x\%$ of the sum assured plus $y\%$ $(y > x)$ of existing bonuses. This development was partly a consequence of the progressively higher amounts invested in equities, and latterly property, reflecting in the bonus declaration the increases in dividends and rents over the years. Special bonuses appeared from time to time to reflect exceptional or non-recurring items of profit. In the mid-sixties terminal bonuses began to be declared partly to reflect the capital appreciation that rightly belonged to the generation of policyholders whose premiums had earned it and partly to combat the competition from unit trusts and linked business.

2.6. Terminal bonus is expressed in one of three ways:

(a) A term-related scale depending on the sum assured and declared reversionary bonuses.
(b) A term-related scale depending on the sum assured.
(c) A percentage of declared reversionary bonuses.

2.7. Method (a) would seem the most logical way of expressing terminal bonuses as the sum assured and reversionary bonuses together represent the policy reserve at maturity and therefore the figure on which capital appreciation should be based. The method could, in theory at least, result in a scale which decreases with term while still producing higher amounts of bonus. This possibility has led some offices to adopt method (b). This second method would however over-declare terminal bonuses for policies under which reversionary bonuses have been previously surrendered. Legislation in the U.K. has made this less of a problem following the passing of the 1970 Finance Act. Method (c) has the advantage of simplicity but implies a rather broad brush approach in terms of equity. It facilitates the inclusion of terminal bonuses on illustrations of projected benefits for new series of with profits contracts: many such series have been introduced in recent years, especially for pensions business.

2.8. The original concept of terminal bonuses was that they would fluctuate to reflect financial conditions prevailing from time to time. The reality has been

different. Terminal bonuses have, like reversionary bonuses, increased progressively, and offices have been reluctant to reduce them except in the most exceptional circumstances such as prevailed in 1974 and 1975.

2.9. Changes in bonus philosophy were, of course, a direct result of changes in the investment policy of life offices. Before the last war investments were almost entirely in fixed interest securities. The cult of the equity developed in the post-war years and by the mid 1950s some offices had as much as 25% of the market value of their investments in ordinary shares. The change in the nature of business being written (from non profit to with profits for permanent assurances, with lower guaranteed levels of benefit) was both the result of investment in equities and the reason for increasing commitments to this sector. The 1960s and 1970s saw a progressive increase in investment in property. At the present time the distribution of assets between real and monetary is in the region of 70% and 30% for many with profit offices.

2.10. There is a general expectation in the industry that bonuses will have to come down if financial conditions continue unaltered. In a recent survey covering with profit policies, offices were asked for their views about the likely future course of bonuses. The replies indicated a general consensus that bonuses would have to reduce, but there were, perhaps naturally, no indications as to when and how this would be achieved. Nevertheless the general expectation of falling bonuses within the industry is now reflected in most illustrations of future benefits being accompanied by cautionary notes and explanations on future bonus prospects.

2.11. A fall in the rate of interest will, in the case of a matched fund, result in a gradual reduction in the yield on the Fund as new money is invested on lower interest rates. Thus, on a stable valuation basis, the rate of reversionary bonus will fall gradually to its ultimate level when the yield on the fund has stabilized. While this would be the natural progression of bonus rates it would clearly be impracticable to follow such a course since it would not be possible to use current rates of bonus in illustrations in the knowledge that bonus rates would reduce if financial conditions remained unchanged. Furthermore, it would be exceedingly difficult to sell with profit policies on the prospect of reversionary bonuses falling for many years into the future, particularly if financial conditions during that period were expected to remain stable.

2.12. The problem that demands our attention can therefore be expressed in the following terms:

If bonuses (and by that I mean the totality of reversionary and terminal bonuses) are to reduce as a result of lower investment returns on new money how should this be arranged so as to:

(a) achieve equity between different generations of policyholders;
(b) facilitate the transaction of new business on reasonable expectations of future returns.

2.13. In their paper "Bonus Distribution with High Equity Backing" (*J.I.A.* **103,** 11) the authors enunciated three basic principles, namely;

1. The estate, insofar as it relates to past generations, should only be drawn upon to meet exceptional adverse experience or to level fluctuations in experience.
2. Basic reversionary bonus rates should be fixed at a level which the office can expect to maintain in the absence of a sustained or substantial change in experience.
3. The policyholder should receive at maturity his 'fair share' of the assets allowing for the return on the investment of his premiums and the effect of 'stabilizing bonuses'.

2.14. To these principles I would add a fourth, which in many ways is the central theme of that paper:

4. The form of the bonus distribution should have regard to the manner in which the assets are invested.

2.15. Equity is an elusive concept in the context of life assurance business. Broadly, it involves giving the with profits policyholder what his premiums have earned, subject to underlying guarantees, after deducting mortality costs and expenses, with an adjustment for a share of profits or losses from other classes of business. The results are averaged over time and over classes of business so as to avoid undue fluctuations, and involve additions to, or drawings from, the estate. The statement is ambiguous: I am content to leave it so and let others attempt a more precise definition.

2.16. As the problems requiring attention are those arising from changes in investment conditions, I propose to concentrate on this aspect to the exclusion of the others. For the purposes of this paper I shall equate 'equity' with 'asset share' calculated on unit trust principles. While bonus distributions do not attempt to reproduce asset shares, the concept is helpful in that it identifies values from which departures are made to honour guarantees, iron out fluctuations and reflect profits and losses from other sources.

2.17. It is clearly desirable to have regard to the nature and term of the assets in determining the form of the bonus declaration. A contract with a high equity backing will in general have a higher proportion of terminal bonus in its payout than one which is invested largely in fixed interest securities. In normal economic conditions offices with the highest payouts tend to be those that have invested a larger proportion in real as distinct from monetary assets. A recent investigation shows the terminal bonus content of maturing policies to range from 20% of the policy proceeds for 10 year contracts to 35% for 25 year policies. There is, however, no unique relationship between the degree of equity backing and the terminal bonus content, but there is evidence of a strong positive correlation between the two.

2.18. It follows that an increase in equity backing either by the direction of larger amounts into the equity sector or a stronger performance within that sector will tend to manifest itself in higher terminal bonuses and vice versa. I shall return to this point later.

## 3. A SIMPLE FINANCIAL MODEL

3.1. It is instructive to consider the behaviour of the simplest of models on a change in financial conditions in that the results suggest possible avenues of approach to bonus declarations that might, in certain circumstances, be applied to more realistic situations.

3.2. Consider a ten year with profit endowment assurance with uniform compound reversionary bonuses of 4·75% declared annually and issued by a mutual life office. For the purposes of this model, terminal bonuses are ignored. If 100 were the invested part of each annual premium, ignoring for simplicity expenses and mortality costs, the maturity value, sum assured, and reversionary bonuses would be respectively:

$$100\ \ddot{s}^{i}_{\overline{10}|},\ \frac{100.\ddot{s}^{i}_{\overline{10}|}}{(1{\cdot}0475)^{10}},\ \text{and}\ 100\ \ddot{s}^{i}_{\overline{10}|}\left(1-\frac{1}{(1{\cdot}0475)^{10}}\right)$$

where $i$ was the net investment return required to maintain bonuses at the specified level.

3.3. For the purpose of ascribing numerical values to these expressions, $i$ has been taken as 9%, a figure close to the net investment return required to maintain reversionary bonuses at the present time for a 10 year policy. The respective amounts are:

1,656, 1,041, and 615

3.4. For the purpose of this model, it is assumed that the net cash flow is invested in stock to yield a net annual income of 9% and is redeemed at par on the maturity date. If the rate of return were to reduce at the end of $t$ years to say 7% net and all premiums and investment income received subsequently were similarly invested, but at the lower rate, the accumulated amount or asset share ($AS_t$) at the end of 10 years would be:

$$100\left[\ddot{s}^{9\%}_{\overline{t}|}+(1{\cdot}09)^{t}\ddot{s}^{7\%}_{\overline{10-t}|}\right]$$

3.5. The rate of reversionary bonus following the fall in interest rates required to produce the asset share would be '$b$' where

$$(1+b)^{10-t}=\frac{\text{Asset Share } (AS_t)}{\text{Sum Assured } (SA)+\text{Reversionary Bonus after } t \text{ years } (RB_t)}$$

3.6. The value of $b$ would vary with the duration in force as the following figures demonstrate:

| t: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| b%: | 3·57 | 3·65 | 3·74 | 3·82 | 3·92 | 4·02 | 4·13 | 4·25 | 4·35 | 4·45 |

3.7. Clearly it would not be practicable under a uniform compound bonus system to declare bonus rates which depend on unexpired term and therefore, if the correct asset shares are to be achieved for maturing policies, the following rates of bonus would have to be declared for all policies in the years following the fall in interest rates.

| Year: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bonus %: | 4·45 | 4·25 | 4·05 | 3·77 | 3·58 | 3·43 | 3·24 | 3·14 | 2·97 | 2·83 | 4·45 | 4·25 | 4·05 |

3.8 A cyclical pattern of bonus rates in stable financial conditions, would clearly be inappropriate and would, in any event, result in incorrect values for policies terminating early. Nevertheless the results are interesting from a narrow theoretical viewpoint.

3.9. In practice, a number of alternatives are possible.

1. Rates of bonus could be allowed to fall gradually to say 3·5%—a level which could be supported by a new policy under the changed financial conditions—and declared at that level thereafter. The over-distribution to policies already in force could be borne by the estate.

   This solution does however have the drawback that bonus rates would continue to fall for some years after interest rates have stabilized at the lower level. It would be exceedingly difficult to transact new business during this period on the prospect of reducing reversionary bonuses.
2. Reduce bonuses immediately to 3·5% to avoid the problem of gradually diminishing bonuses and declare terminal or special bonuses for policies becoming claims soon after the change. Terminal bonuses are, of course, the simplest mechanism for achieving equity in such circumstances but their introduction as a temporary measure may well create expectations for their continuance.

   Furthermore a sudden reduction in bonuses on policies which had recently been effected in expectation of the continuation of the last declared rates would be difficult to explain unless the ground work for such a change had been carefully prepared.
3. Move to a modified compound reversionary bonus system. If '$x$' is the rate of bonus declared on the sum assured (the simple rate) and '$y$' the rate of bonus declared on previously declared bonuses (the compound rate), the accumulated bonuses after $n$ years on a sum assured of 1 would be $x\, s^{y}_{\overline{n}|}$. If a combination of $x$ and $y$ can be found which will produce, as near as may be, asset values calculated on the basis of the model, for policies that have been in force for various periods at the time financial conditions change, this could provide the framework for an acceptable solution.

3.10. As before the asset share ($AS_t$) of the policy considered in the model is given by the expression

$$100\left[\ddot{s}^{9\%}_{\overline{t}|} + (1{\cdot}09)^{t}\, \ddot{s}^{7\%}_{\overline{10-t}|}\right]$$

where

100 is the invested premium and

$t$ the number of years during which investments were made at 9% before the reduction to 7%.

3.11. If $(SA)$ is the sum assured and $(RB_t)$ the reversionary bonus declared after $t$ years then

$$(AS_t) = (SA)\left(1 + x\, s^{y}_{\overline{10-t}|}\right) + (RB_t)\,(1+y)^{10-t}$$

from which

$$x = \frac{(AS_t) - (RB_t)(1+y)^{10-t} - (SA)}{(SA)\, s^{y}_{\overline{10-t}|}}$$

For values of $t$ ranging from 1 to 9, values of $x$ and $y$ can be calculated which satisfy the above equation.

3.12. The following table shows the values of $x$ corresponding to various values of $y$ for $t = 1, 3, 5, 7$, and 9.

| | $y$ | | | | |
|---|---|---|---|---|---|
| $t$ | 4% | 5% | 6% | 7% | 8% |
| 1 | 3·58 | 3·38 | 3·19 | 3·00 | 2·82 |
| 3 | 3·77 | 3·49 | 3·22 | 2·94 | 2·68 |
| 5 | 4·03 | 3·67 | 3·31 | 2·95 | 2·60 |
| 7 | 4·36 | 3·92 | 3·47 | 3·03 | 2·60 |
| 9 | 4·68 | 4·17 | 3·65 | 3·13 | 2·61 |

3.13. An examination of the table suggests that, in round numbers, a simple rate of bonus of 3% associated with a compound rate of 7% would reproduce the asset values with reasonable accuracy irrespective of the duration in force at the time of the interest change. These rates would also be appropriate for new policies effected after the fall in interest rates. If this combination of bonuses applied to policies of other terms, it would provide a satisfactory solution to the problem. Calculations made for a 25 year endowment assurance did not, however, produce the same results. A combination of a simple bonus of 3.10% and a compound bonus of 5.00% reproduced asset shares with reasonable accuracy for this term of policy.

3.14. The limited conclusion that could be drawn from this investigation is that where the terms of policies issued by an office fall into a narrow range, by reason, for example, of its operating in a particular sector of the market, increasing the compound bonus rate and at the same time reducing the simple bonus rate, will provide a fair distribution of profits and enable illustrations of future benefits to be made on a reasonable basis.

## 4. MIXED EQUITY/GILT MODELS

4.1. The financial model considered in the previous section was artificial and does not represent the actual distribution of assets found in most U.K. life offices. Investment strategies vary from office to office and from year to year and no typical portfolio exists for the industry as a whole. Nevertheless, it is necessary in any attempt to reflect reality to allow for a measure of investment in real as distinct from monetary assets.

4.2. Besides equities, property now represents a substantial part of the investments of a life fund. The reasons for investing in property are much the same as those for investing in equities, namely the prospect of increasing income and capital appreciation. In addition, property values have tended to be less volatile than equity values. For convenience and because it would not materially affect the outcome of the calculations, I have included property under the heading of equities.

4.3. I have defined, in the case of an equity investment, an initial (after tax) dividend of $d$ increasing at the rate of $f$ per annum with capital appreciation at the same rate. Thus, if dividends are payable annually in arrear with a first dividend of $d(1+f)$, the accumulation after $n$ years of 1 invested in equities with net dividends also so invested would be

$$(1+d)^n(1+f)^n$$

and the accumulation of 1 pa in advance for $n$ years

$$\ddot{s}_{\overline{n}|}^{\theta} \text{ where } \theta = (1+d)(1+f)-1$$

4.4. If, at the end of $t$ years, there was a fall in the rate of interest and inflation, resulting in equity values appreciating by 100c%, with dividends thereafter being $d'$ and increasing by $f'$, then it can be shown that the accumulation after $n$ years from outset of 1 pa invested in equities would amount to

$$\ddot{s}_{\overline{t}|}^{\theta}(1+c)(1+\theta')^{n-t}+\ddot{s}_{\overline{n-t}|}^{\theta'}$$

where $\theta' = (1+d')(1+f')-1$

4.5. It can also be shown that the 'book value' of the accumulation is

$$n+d(1+f)\left[(Is)_{\overline{t}|}^{\theta}+s_{\overline{t}|}^{\theta}\,\ddot{s}_{\overline{n-t}|}^{\theta}\right]+d'(1+f')(Is)_{\overline{n-t}|}^{\theta'}$$

The book value is taken as the amount at which investments and reinvestments are made.

4.6. Two models were considered, one where equal amounts of the premium were invested in equities and in matched gilts, and another where 70% was

invested in equities and 30% in gilts. It was assumed that the investment income was reinvested in the same sector.

4.7. While a 70% investment in equities may be considered high in relation to a life fund as a whole, it will not, in many cases, be unrepresentative of the assets notionally hypothecated to with profits business, if it is felt that gilt and other fixed interest investments should be apportioned firstly to non-profit immediate annuity and term assurance business.

4.8. The numerical values used in the model are as follows:

| | *Before t* % | *At t* % | *After t* % |
|---|---|---|---|
| Net interest | 9 | | 7 |
| Net dividend yield on equities | 3.85 | | 3.325 |
| Annual rate of dividend increase and capital appreciation | 10 | | 7 |
| Capital appreciation | | 15 | |

4.9. While these numerical values are not intended to reflect financial conditions precisely in the recent past they have been chosen to illustrate the broad effect of changes which have occurred.

4.10. Appendices 1 and 2 set out the asset shares, equity content, and the book values at maturity for the financial models for 10 year and 25 year policies respectively.

4.11. The excess of the asset value over the total of the sum assured and reversionary bonuses represents the amount available for terminal bonuses. The last row of Appendices 1 and 2 shows the position of policies maturing before the change in interest rates. For such policies the sum assured and reversionary bonuses for 10 year and 25 year policies are respectively 1,656 and 9,232 and the corresponding terminal bonuses 289 and 6,161 under the 50/50 model. The ratios of the terminal bonus to the total payout under the policy (taken here to be the asset share) is referred to as the Terminal Bonus Content (TBC). These ratios are ·149 and ·4 for 10 year and 25 year policies respectively.

4.12. The Equity Backing Ratio (EBR) was defined in the paper "Bonus Distributions with High Equity Backing" as the ratio of the equities allocated to a particular class of policies to the liabilities for that class. In this paper I use the expression in the context of an individual policy and define it as the ratio of the value of equities required to support the policy reserve, to the reserve (which just prior to maturity is the sum assured and reversionary bonuses). Thus in the models used

$$(\text{EBR}) = \frac{R - \text{GC}}{R}$$

where $R$ is the reserve for the policy and GC is the gilt component of the asset value.

The EBR's for 10 year and 25 year policies maturing just before the change in financial conditions are ·5 in each case for the 50/50 model and ·7 in each case for the 70/30 model.

4.13. There is, of course, no precise relationship between the TBC's and the EBR's and none should be expected bearing in mind the manner in which the model was constructed. The model does, however, reflect the characteristics of bonus patterns in the industry in that the TBC is positively correlated with the term of the policy and that offices with large terminal bonuses also tend to have large investments in real assets.

4.14. The first row of Appendices 1 and 2, which show the position at maturity for policies effected after the change in financial conditions, can now be compared with the results of the gilt model where $t$ is 10 and 25 respectively. It can be seen from the asset shares that with the marginal exception of the 10 year policy under the 50 50 model, reversionary bonuses could be supported at the original rates.

4.15. In the circumstances the terminal bonus would disappear under the 50/50 model and be dramatically reduced under the 70/30 model. The position is summarized in the following table:

| | *50/50 Model* | | | |
|---|---|---|---|---|
| *Term of Policy* | *10 Years* | | *25 Years* | |
| | EBR | TBC | EBR | TBC |
| Before change | ·500 | ·149 | ·500 | ·400 |
| After change | ·554 | | ·633 | ·007 |
| | *70/30 Model* | | | |
| | *10 Years* | | *25 Years* | |
| | EBR | TBC | EBR | TBC |
| Before change | ·700 | ·196 | ·700 | ·483 |
| After change | ·732 | ·032 | ·780 | ·105 |

4.16. The figures show that the EBR increases after the change while the TBC reduces significantly leaving the office exposed to even modest falls in equity values—a situation with which few actuaries would feel comfortable.

4.17. The figures lead me to conclude that the maintenance of reversionary bonuses at a level which results in liabilities very nearly equal to the asset share when over half the assets are unmatched and liable to fluctuate would result in an untenable position unless there was a large and growing estate to support bonuses in adverse conditions.

4.18. Clearly, therefore, there must be a reduction in the rate of reversionary bonus if the office is to live easily with a mixed portfolio of assets, or if it adopted a wholly fixed interest investment strategy with its consequences of a lower expected yield.

4.19. The next part of the paper is devoted to considering the co-existence of high EBR's with the bonus systems we have adopted. There are many ways in which the problem can be explored. Those considered here are by way of examples and are not intended to be exhaustive.

## 5. POSSIBLE SOLUTIONS

5.1. There are a number of factors to be taken into account in deciding on the optimum solution. These include an evaluation of the relative amounts of surplus to be released by way of reversionary bonus and terminal bonus, the manner in which the assets are invested, the protection afforded to the office on a fall in equity values and the acceptability of different combinations of reversionary and terminal bonuses to the market generally.

5.2. In assessing a particular approach I have looked first at the results for a policy effected after the change in financial conditions and, provided the results were satisfactory, examined the effect on policies in force.

5.3. There has been a trend, discernible even before interest rates started to fall from the historically high level of a few years ago, to distribute more through the terminal bonus system. One possible approach would therefore be to maintain the level of TBC and adjust reversionary bonuses appropriately. With this approach the rate of uniform compound reversionary bonus $b$ would be derived from the formula

$$(SA)\,(1+b)^n = (AS)\,(1-\text{TBC})$$

where $(SA)$ and $(AS)$ are the sum assured and asset shares respectively and $n$ the policy term.

5.4. The following table summarizes the results:

| | *50/50 Model* | | *70/30 Model* | |
|---|---|---|---|---|
| *Policy Term* | *10 Years* | *25 Years* | *10 Years* | *25 Years* |
| TBC | ·149 | ·400 | ·196 | ·483 |
| Reversionary Bonus Rate | 3·01% | 2·66% | 2·82% | 2·47% |
| EBR | ·472 | ·393 | ·678 | ·619 |

5.5. From the figures in Appendices 1 and 2 it can be calculated that equity values could fall by over 25% before 10 year policies were uncovered and similarly by over 60% for 25 year policies.

5.6. Such an approach would probably result in reversionary bonuses being fixed at about 2·75% which would represent too large a reduction to be acceptable in the market.

5.7. Another approach would be to determine reversionary bonus rates such that the EBR's were the same for policies effected after the change as for policies maturing before. On this basis the rate of reversionary bonus would be derived from the formula

$$(SA)\,(1+b)^n = \frac{\text{GC}}{1-(\text{EBR})}$$

where GC is the gilt content of the asset share.

5.8. The following table summarizes the results:

| | *50/50 Model* | | *70/30 Model* | |
|---|---|---|---|---|
| Policy Term | *10 Years* | *25 Years* | *10 Years* | *25 Years* |
| EBR | ·500 | ·500 | ·700 | ·700 |
| Reversionary Bonus Rate | 3·57% | 3·46% | 3·57% | 3·46% |
| TBC | ·102 | ·272 | ·136 | ·344 |

5.9. In practice a bonus rate of 3.50% would be appropriate. Equity values could fall by 20% before 10 year policies were uncovered and similarly by 42% for 25 year policies.

5.10. An alternative solution which is more likely to gain acceptability in the market would be a bonus of 3% of the sum assured plus 6% on existing bonuses. The relevant ratios are shown below:

| | *50/50 Model* | | *70/30 Model* | |
|---|---|---|---|---|
| *Policy Term* | *10 Years* | *25 Years* | *10 Years* | *25 Years* |
| EBR | ·491 | ·558 | ·695 | ·735 |
| TBC | ·117 | ·176 | ·150 | ·257 |

5.11. With this combination of bonuses, equities would have to fall by some 21% and 30% before 10 year and 25 year policies were uncovered. Appendices 3 and 4 show the EBR's and TBC's for policies in force on the assumption that reversionary bonus, after a fall in interest rates, will be at these levels.

5.12. Appendix 5 sets out a method of calculating terminal bonuses based on asset shares.

5.13. A further approach is to have regard to the margin between the book value and the asset share in determining the rates of reversionary and terminal bonus. Reversionary bonus may be regarded as arising from revenue surplus with such transfers from investment reserve (the excess of the asset share over book value) as is felt necessary and prudent to make in order to support the level of bonus it is wished to declare.

5.14. The book value of the assets relating to a 10 year policy maturing before the change in financial conditions is 1512 and so a transfer of 144 or 33% of the investment reserve of 433 would have been necessary to balance the books. Book values after the change will support a reversionary bonus of 2·83% without any transfer from investment reserve. The corresponding bonus for a 25 year policy is 3·1%. For the 70/30 model the revenue surplus will support bonuses of 2·52 and 2·95 for 10 year and 25 year policies respectively.

5.15. While book values are no more than historic cost they are nevertheless fundamental to life fund accounting and form a convenient basis for separating the revenue and capital components of surplus. The net premium valuation is the normal mechanism for the emergence of natural or revenue surplus and book values are an integral part of that system.

5.16. An office investing in equities as distinct from gilts does so at the expense of investment income in the early years. The shortfall in income may never be recouped on the fund as a whole even with the benefit of dividend increases if, as a result of business expansion, increasing amounts are invested in this sector. If

reversionary bonuses were to derive entirely from revenue surplus, a pattern of increasing bonuses would occur or bonuses could take the form of a lower rate on the sum assured and a higher rate on existing bonuses as referred to earlier in the paper. Alternatively, investment income could be supplemented by a transfer from investment reserve (provided it were feasible to do so) to support reversionary bonuses at the level appropriate to a wholly gilt portfolio. The practice is not uncommon and, provided the fund as a whole has sufficient free reserves, is perfectly sound. If this practice were adopted, the results would be identical to those arising from the maintenance of EBR's, namely bonus rates of 3·57% and 3·46% for 10 year and 25 year policies respectively.

## 6. PENSIONS BUSINESS

6.1. So far attention has been directed to life business. Individual pensions business has grown in recent years partly as a result of changes in legislation and partly because of increases in the levels of commission paid for such business.

6.2. Early contracts were written as deferred annuities while more recently they have taken the form of pure endowments with annuity options. The development of these contracts thus coincided with the period of high interest rates in the 1970's with the result that reversionary bonuses started at a high level and went even higher. It is not uncommon for such contracts to require an investment return of 15% for the maintenance of current rates of reversionary bonus.

6.3. The problems associated with bonus declarations for this class of business are thus very similar to those for life business and the approach to solutions much the same. In some respects the problem here is more acute in that it is probably easier, by a suitable choice of investments and judicious tax management, to support a high net yield than a correspondingly high gross one.

## 7. NEW SERIES

7.1. Consideration has so far been given to changing bonus rates so that the same rate or rates of reversionary bonuses apply to all business on the books and to new policies issued after the change.

7.2. An alternative strategy would be to start a new series of with profit policies with different bonuses and allow policies in existence to participate in their own surplus. The proposition does have some attractions.

7.3. In the first place it allows reversionary bonuses to fall gradually to their eventual level with terminal bonuses making up the balance of the asset share. This has the advantage that a recently effected policy for which illustrations will have been based on the original rates of bonus will show only a small reduction in expected bonuses initially although that reduction will have to continue for many years. While causing disappointment the method enables policyholders to adjust gradually to the changed circumstances and take appropriate steps to make up for the likely shortfall in the claim proceeds. Such a course might be appropriate, for example, in the case of endowment mortgages.

7.4. A new series gives the office the opportunity of reviewing its bonus philosophy and changing the shape and level of its premium rates without the constraints of considering the effects on existing business. The current systems of bonus distribution have evolved over the years more as a result of changes in financial conditions than in response to the needs of policyholders. It is possible that with more efficient and flexible means of collecting premiums, a system of chargeable premiums which depend on financial conditions with lower bonuses might be more suitable for the future.

7.5. Opening a new series is, however, not without its disadvantages. The reluctance, or inability, to deal with bonus reductions under the same series will inevitably lead to a fragmentation of the business as new series are opened every time there is a sustained reduction in the level of interest rates. Although interest rates have remained at their present level for about 2 years there is a real prospect that they will fall still further. Exactly when a new series should be opened will be difficult to judge and impossible to predict. Managing and dealing equitably with different series of with profit business becomes difficult because of commercial pressures to support the current series at the expense of the old.

7.6. On balance a new series would be justified and indeed necessary where the structure of the policy is radically altered, but not, in my view, merely to cope with change in financial conditions.

## 8. PRACTICAL PROBLEMS

8.1. If it appears likely that investment returns in the future will be such that current levels of bonus cannot be maintained, what steps should be taken in anticipation of that eventuality? The problem is made more difficult because of a long history of rising bonuses, and is compounded by the way in which the life assurance industry illustrates projected benefits to prospective policyholders.

8.2. As mentioned earlier, many offices are now qualifying their illustrations with cautionary notes and explanations designed to inject a sense of realism into future projections made on current historically high rates of bonus. Nevertheless, declaring a rate of bonus, lower than that used in illustrations issued shortly before, is likely to put a severe strain on the credibility of the office, and give rise to much dissatisfaction.

8.3. One solution would be to maintain reversionary bonuses at their current level and progressively reduce terminal bonuses. This approach certainly avoids, or at least postpones, the disappointment to the policyholders, but generates problems of its own, no less acute for being less obvious.

8.4. Another approach would be to clearly signal future intentions by either a lower interim bonus, or by declaring lower ordinary bonuses coupled with a special bonus to make good the shortfall. In either case, recently effected policies would initially receive bonuses at the illustrated levels and the scene would be set for lower bonuses thereafter.

8.5. Any downward movement in reversionary bonuses will, despite all logical

expectations and explanations, be viewed as sign of weakness and individual offices will be loath to contemplate such a step in isolation. Whether there will be support for concerted action by a number of offices remains to be seen.

## 9. FINAL THOUGHTS

9.1. I have rejected the word conclusions to describe this last section of the paper. The word suggests the end of an argued case for a particular course of action. This cannot be so in circumstances such as these. However, certain courses of action emerge as more suitable than others.

1. Terminal bonuses emerge as an essential ingredient in arriving at fair shares for different generations of policyholders and protecting the office against adverse market movements. This is particularly so when there are major shifts in economic trends and when a high proportion of assets is in variable income investments.
2. Reducing reversionary bonus in the circumstances described must be more sensible than maintaining reversionary bonuses and reducing terminal bonuses. The latter course would result in maturity proceeds under with profit policies moving in the opposite direction to those under linked policies and would be difficult to explain.
3. Reversionary bonuses should be altered, so far as is practicable, by moving to a reparticipating system or where such a system already operates, widening the difference between the rate of bonus on the sum assured and that on existing bonuses. Such a change recognizes the incidence of emergence of revenue surplus and will probably be more acceptable to the market generally than a simple rate reduction.
4. It is essential to communicate to agents and policyholders the effect of the financial changes taking place in the life fund and the implications for them of such changes. The issue of bonus notices provides a suitable opportunity for doing this, which many offices now use.

9.2. Many problems exist and some have been exacerbated as a result of the industry's apparent commitment to maintaining historically high rates of reversionary bonuses in circumstances when it would have been more logical to take the opportunity of bringing down reversionary bonuses at the same time as substantial increases in terminal bonuses were made.

9.3. The financial strength of the traditional life office has in large measure enabled it to defer taking decisions which in new business terms could be regarded as retrograde. That strength could be eroded in a relatively short time if bonuses which have not been earned continue to be declared on the very substantial volumes of business which have been written in recent years. If reversionary bonuses are to be reduced it must be preferable to do so from a position of strength.

9.4. I am grateful to my actuarial colleagues for the numerous exchanges of

ideas on the subject of this paper and for the patience with which they have borne the parading of my early and nebulous thoughts on the matter and in particular to David N. Roberts for his help in constructing the financial models. Appendix 5, dealing with terminal bonuses, is based on the practice of my own office.

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## APPENDIX 1

Table showing the asset shares, equity content, and book values of assets at th end of 10 years where the invested portion of each annual premium is 100 an where financial conditions changed at the end of $t$ years.

The assumptions on which the calculations are made are described in th paper.

| $t$ | 100% Gilt model | 50% Equity, 50% Gilt model | | | 70% Equity, 30% Gilt model | | |
|---|---|---|---|---|---|---|---|
| | | Asset share | Equity content | Book value | Asset share | Equity content | Book value |
| 0 | 1,478 | 1,645 | 906 | 1,376 | 1,710 | 1,267 | 1,335 |
| 1 | 1,506 | 1,684 | 931 | 1,395 | 1,755 | 1,303 | 1,351 |
| 2 | 1,532 | 1,725 | 959 | 1,414 | 1,803 | 1,343 | 1,367 |
| 3 | 1,556 | 1,769 | 991 | 1,432 | 1,854 | 1,387 | 1,382 |
| 4 | 1,579 | 1,814 | 1,024 | 1,449 | 1,908 | 1,434 | 1,397 |
| 5 | 1,599 | 1,861 | 1,062 | 1,465 | 1,966 | 1,486 | 1,411 |
| 6 | 1,617 | 1,910 | 1,102 | 1,478 | 2,026 | 1,541 | 1,424 |
| 7 | 1,632 | 1,959 | 1,143 | 1,491 | 2,090 | 1,600 | 1,435 |
| 8 | 1,643 | 2,010 | 1,188 | 1,501 | 2,156 | 1,660 | 1,444 |
| 9 | 1,652 | 2,061 | 1,235 | 1,508 | 2,225 | 1,729 | 1,450 |
| 10 | 1,656 | 1,945 | 1,117 | 1,512 | 2,061 | 1,564 | 1,455 |

*Notes:*

The asset share represents the accumulation of the invested portion of each annual premium to the end of the policy term.

The equity content is that part of the asset share represented by investment in equities.

The book value is the total of the amounts invested and reinvested during the currency of the policy.

## APPENDIX 2

Table showing the asset share, equity content, and book values of assets at the end of 25 years where the invested portion of each annual premium is 100 and where financial conditions changed at the end of $t$ years.

The assumptions on which the calculations are made are described in the paper.

| | 100% Gilt | 50% Equity, 50% Gilt model | | | 70% Equity, 30% Gilt model | | |
|---|---|---|---|---|---|---|---|
| $t$ | model | Asset share | Equity content | Book value | Asset share | Equity content | Book value |
| 0 | 6,768 | 9,298 | 5,914 | 6,205 | 10,310 | 8,280 | 5,981 |
| 1 | 6,894 | 9,475 | 6,028 | 6,305 | 10,510 | 8,442 | 6,069 |
| 3 | 7,148 | 9,874 | 6,300 | 6,515 | 10,965 | 8,821 | 6,262 |
| 5 | 7,402 | 10,322 | 6,621 | 6,738 | 11,490 | 9,269 | 6,473 |
| 7 | 7,653 | 10,815 | 6,988 | 6,971 | 12,080 | 9,784 | 6,698 |
| 10 | 8,021 | 11,637 | 7,626 | 7,331 | 13,083 | 10,677 | 7,055 |
| 13 | 8,370 | 12,550 | 8,365 | 7,694 | 14,222 | 11,711 | 7,423 |
| 16 | 8,686 | 13,549 | 9,206 | 8,041 | 15,494 | 12,888 | 7,783 |
| 19 | 8,951 | 14,630 | 10,154 | 8,350 | 16,901 | 14,216 | 8,109 |
| 22 | 9,144 | 15,786 | 11,214 | 8,586 | 18,443 | 15,770 | 8,363 |
| 25 | 9,232 | 15,393 | 10,777 | 8,701 | 17,858 | 15,088 | 8,488 |

*Notes:*

The asset share represents the accumulation of the invested portion of each annual premium to the end of the policy term.

The equity content is that part of the asset share represented by investment in equities.

The book value is the total of the amounts invested and reinvested during the currency of the policy.

## APPENDIX 3

Table showing the Equity Backing Ratio (EBR), and Terminal Bonus content (TBC) at the maturity of a 10 year policy where financial conditions changed at the end of $t$ years and where reversionary bonuses were 4·75% p.a. compound before the change and 3% on the sum assured and 6% on bonuses after.

| $t$ | 50% Equity, 50% Gilt model | | 70% Equity, 30% Gilt model | |
|---|---|---|---|---|
| | EBR | TBC | EBR | TBC |
| 0 | ·491 | ·117 | ·695 | ·150 |
| 1 | ·492 | ·119 | ·695 | ·154 |
| 2 | ·493 | ·124 | ·696 | ·161 |
| 3 | ·494 | ·131 | ·696 | ·171 |
| 4 | ·494 | ·140 | ·696 | ·182 |
| 5 | ·494 | ·150 | ·697 | ·196 |
| 6 | ·495 | ·162 | ·697 | ·211 |
| 7 | ·495 | ·175 | ·697 | ·227 |
| 8 | ·496 | ·189 | ·698 | ·244 |
| 9 | ·498 | ·202 | ·699 | ·261 |
| 10 | ·500 | ·149 | ·700 | ·196 |

*Notes:*

The EBR is the proportion of the policy reserve backed by equities.

The TBC is the ratio of the Terminal Bonus to the asset share.

## APPENDIX 4

Table showing the Equity Backing Ratio (EBR), and Terminal Bonus Content (TBC) at the maturity of a 25 year policy where financial conditions changed at the end of $t$ years and where reversionary bonuses were 4·75% p.a. compound before the change and 3% on the sum assured and 6% on bonuses thereafter.

| $t$ | 50% Equity, 50% Gilt model | | 70% Equity, 30% Gilt model | |
|---|---|---|---|---|
| | EBR | TBC | EBR | TBC |
| 0 | ·558 | ·176 | ·735 | ·257 |
| 1 | ·561 | ·170 | ·737 | ·252 |
| 3 | ·565 | ·168 | ·739 | ·250 |
| 5 | ·565 | ·175 | ·739 | ·259 |
| 7 | ·563 | ·191 | ·738 | ·276 |
| 10 | ·555 | ·225 | ·733 | ·311 |
| 13 | ·544 | ·268 | ·727 | ·354 |
| 16 | ·532 | ·315 | ·719 | ·401 |
| 19 | ·519 | ·363 | ·712 | ·449 |
| 22 | ·508 | ·411 | ·705 | ·496 |
| 25 | ·500 | ·400 | ·700 | ·483 |

*Notes:*

The EBR is the proportion of the policy reserve backed by equities.

The TBC is the ratio of the Terminal Bonus to the asset share

## APPENDIX 5

### TERMINAL BONUSES

The method described below for calculating terminal bonuses is based on the asset share approach and involves the following stages:

1. Determining the asset share.
2. Constructing a scale of terminal bonuses.

*Determining the asset share*

Consider a maturing with profit endowment assurance issued by a mutual life office $n$ years ago.

Let $(IP)_r$ be the invested portion of the premium in year $r$ averaged over all ages

and $i_r$ be the rate of investment return on the fund in year $r$

The asset share of the policy is given by

$$\sum_{r=1}^{n} (IP)_r \prod_{s=r}^{n} (1+i_s) \tag{A}$$

where $i$ is found from the formula

$$i = \frac{I+G}{F}$$

and $I$ is the net investment income attributable to the business

$G$ is the realized and unrealized capital appreciation (or depreciation), after tax on realized profits, occurring in the year

$F$ is the market value of the fund at the beginning of the year plus one half of the net new money invested in the year.

An allowance for tax on unrealized gains is best made by deducting from (A) the discounted value of the tax payable on the lines generally made for linked business.

As an approximation, a level amount $(IP)$ may be used in place of values according to duration with little loss of accuracy and formula (A) reduces to the slightly more manageable form of

$$(IP) \sum_{r=1}^{n} \prod_{s=r}^{n} (1+i_s) - g \tag{B}$$

where $g$ is the tax reserve for unrealized gains.

*Constructing a scale of terminal bonus*

The amount available for terminal bonus is obtained by deducting the sum assured and reversionary bonuses from the asset share (B). Prudence dictates that

a contingency margin be retained to give temporary support to terminal bonuses in adverse conditions and to allow for the occasions when the results of the calculations would be negative. This margin may take the form of a uniform percentage deduction or a percentage deduction decreasing with term if an examination of the terminal bonus content and the equity backing ratios show, as in the case of the models used in this paper, that less protection is required for the longer term policies.

The amount to be distributed by way of terminal bonus may then be expressed in terms of the sum assured, or the sum assured and reversionary bonuses, and a smooth scale produced for policies of all terms.

## ABSTRACT OF THE DISCUSSION

**Mr T. A. Jones** (opening the discussion): Few actuaries working in life offices cannot have been concerned about the way bonus rates have steadily risen in the last 20 years, and in particular about the implied pseudo-guarantee of future levels of bonus. In his 1981 paper (*J.I.A.* **108,** 361), the late Frank Redington described the insurance industry as being like enthusiastic children climbing a sea cliff, who have climbed too far, yet cannot retreat. The situation does not seem to have changed much in the last four years. Over the last two years, yields on gilts have stubbornly remained in double figures. I am sorry they have not fallen further—they might have forced us to address sooner the problems in this paper. As it is, I hope this paper will be the stimulus for our profession and our industry to tackle now the problems caused by a fall in interest rates.

When reading this paper, the concept of reasonable expectations of policyholders was very much in my mind. Current illustrations of benefits show telephone numbers, based on current bonus rates. Only in the small print on the back, which few people read, and even fewer understand, will you find it suggested that bonus rates might fall. If they do fall, and policyholders' expectations are not satisfied, both the life assurance industry and our profession will lose credibility. The current situation is clearly unsatisfactory and is recognized as such, but little appears to be happening. Life assurance policies, by their nature, last a long time; we are creating problems for ourselves in the future, and it is urgent that we get our methods of illustration on to a sensible basis.

An illustration is required for two purposes; in order to find an office giving good value for money, and to get an estimate of the likely benefits. I do not believe that the current system achieves either of these two aims. I am sure that we can learn something from unit-linked illustrations. They show benefits based on a range of fixed unit price growth rates. In addition, statistics are available showing the past performance of offices' unit-linked funds. The situation is clouded by the multiplicity of management charges, but the right ingredients are there to find an office giving good value for money. In practice, fund performance is normally vastly more important than the charges being made, and the policyholder can get an estimate of his likely benefits, based on what he feels is a sensible future growth rate. For a with-profits contract, an illustration would need to show the benefits based on the bonus rates likely to be declared on certain future interest rate assumptions, and a range of different rates would be required. Secondly, it would need to show the average interest rates which were necessary to give the life cover and maturity benefits on policies currently maturing; this would allow meaningful comparison of offices' past performance. And lastly, but not very importantly, we could show current bonus rates.

I appreciate that the above is a gross simplification—the effect of profits from mortality, expenses and non-profit business is ignored. But it does have three important advantages; a policyholder can choose for himself a future interest rate, to estimate his maturity value; it takes the spotlight off current bonus rates, although a reduction would still be painful; it avoids the worst error of current practice, that of combining current high reversionary bonus rates with current terminal bonus rates, which really only apply to maturing policies which received much lower reversionary bonus rates in the past.

One Scottish office already quotes on broadly the basis I have outlined above. Its contract, though, is not a conventional with-profits plan, but a new style unitized with-profits plan, where interest and bonus additions are made to an accumulated fund. It is much easier to illustrate a unitized plan on the above basis.

A working party of the Life Offices Association is currently considering with-profits illustrations. I very much hope that it, and other moves, are successful in shifting the emphasis away from current bonus rates. I expect there will be much discussion this evening on this subject.

Section 2 deals with methods of bonus distribution and of equity. In §§ 2.6(a) and (b) the author mentions how terminal bonus can be term-related. However, this implies a steadily increasing terminal bonus rate as a policy ages. I feel that a better method is for terminal bonus to be based on year of entry, where there is no such implication.

In § 2.8, I feel that the author has been a little harsh on the industry when he complains that offices

have been reluctant to reduce terminal bonus levels, except in 1974. Certainly over the last ten years, equity values have risen pretty steadily—there has been little justification for a fall in bonus rates.

I noted the first principle of §2.13, that the estate should only be drawn upon to level out fluctuations. It is difficult to decide when a temporary fluctuation has become a permanent reduction in yield. Certainly it is important that the estate must not be drawn upon to support a bonus rate at a higher level than can be afforded in the long term. But there is a balance between equity for policyholders and the smoothing out of returns. The major benefit to the policyholder of with-profits business is the stabilized return, as compared with the fluctuations of unit-linked, or the high cash guarantee of non-profit. The policyholder buys a with-profits policy for the stabilized return, because he likes this form of profit distribution. It is important that we continue to offer the policyholder what he wants, rather than produce a nice solution to an actuarial problem, or a solution which is convenient to us.

The author proposes a fourth principle in §2.14, that the form of the bonus distribution should have regard to the manner in which the assets are invested. I would suggest that the relationship is the reverse: that the manner in which the assets are invested should have regard to the form of the bonus distribution. Moreover, should we be aiming at equity for policyholders, or should we be stabilizing returns—to what extent should the insurance concept involve smoothing between generations? How far one should depart from the asset-share figures if, say, there is a slump in equity prices, is a major consideration in the management of a with-profits portfolio. I leave the question open.

Appendix 5 gives a model for calculating terminal bonus rates, by building up asset shares for each tranche of business. Of course, in practice one would want to make allowance for the value of the life cover given during the term of the contract. This will lead to a smaller asset share, to be shared out amongst the survivors. I also wonder whether an allowance should be made for the profit or loss arising from the office's non-profit business. Of course, the above practice only works for maturity benefits. For death benefits, a similar technique can be employed. However, in practice the scale derived for maturing endowment policies would probably be used.

Section 3 shows a very simple model, but §3.9 raises some very interesting questions regarding bonus distribution. The major problem is deciding that a fall in interest rates is permanent, leading to a fall in bonus rates. There is bound to be some delay in making that decision. The drawback to alternative 1, the gradual reduction in reversionary bonus rates, could be removed if illustrations were on a more sensible basis, and I think that this is the method which most actuaries would select. I initially disregarded method 3, the modified compound reversionary bonus method, as being too theoretical, but on thinking further it has a lot going for it. It gives a low bonus early in the term, which is useful if you are not sure of interest rates, and yet it gives much more towards the end of the term as things get more definite. It seems to avoid the necessity for large terminal bonus rates, which are often required because of the need for caution when setting the reversionary rate. There was a very interesting paper written on this subject by Carr and Ward to the Institute of Actuaries of Australia, and I would recommend it to anyone interested in this concept.

Section 4 considers the more realistic model of a mixed equity and gilt portfolio. The situation after the change in conditions is clearly unsatisfactory, and a cut in terminal bonus rate also is insufficient.

Section 5 looks at possible solutions. It is necessary to strike a balance between a reduction in reversionary bonus rate and a reduction in terminal bonus rate following the fall in asset shares. The author uses Equity Backing Ratio to help him strike this balance. Effectively, Equity Backing Ratio is that proportion of the reserve not backed by gilts. However, the point about equities is that they cannot be used to match liabilities fixed in cash terms, which is particularly relevant close to maturity. This susceptibility to a fall in equity prices leads me to an alternative solution. I consider terminal bonus, or part of it, can be used as a safety net in case equity prices fall, before the estate has to be drawn on to support the bonus rate. It is therefore useful to look at the proportion by which equity prices can fall before the basic sum assured and reversionary bonus at maturity is uncovered. To keep that proportion the same after the change in conditions as it was before, requires a bonus rate of around 3%, which is somewhat lower than the author proposed in §§5.7–5.9. Of course, provided the reversionary bonus rate has been set on a conservative basis, the sum assured and reversionary bonus will be less than the asset share at maturity. The longer the term of the policy, the further the sum assured and reversionary bonus will fall below the asset share. There must come a point where this

gap, which is effectively our terminal bonus, is larger than we would want purely as a safety net for equity price fluctuations. It may give the policyholder and his adviser the impression that the maturity value is more volatile than is actually the case. It is obviously impracticable to declare a higher reversionary bonus rate on longer term policies than on short term ones. However, the concept of paying a higher bonus on existing bonus effectively achieves this. The similarity of the terminal bonus rates for the two terms in the table in § 5.10 as compared with those in the previous tables is evidence of this. This leads me to conclude that this method of bonus distribution is particularly appropriate for policies backed by investment in equities.

I take issue with the author when he states, in § 5.15, that book values are fundamental to life office accounting and form a convenient basis for separating the revenue and capital components of surplus. This may have been true when little of the investment return came from capital gains, but cannot be true today. How would this basis cope with a conventional gilt bought at deep discount? Presumably only by the artificial method of writing it up each year. The same must go for an index-linked gilt, and presumably for an equity. The valuation must be chosen to fit the bonus declaration policy, rather than the other way round.

I agree entirely with the author's views on pensions business. I particularly wish to emphasize the point that because of the relatively tax-free nature of capital gains, a high net yield is easier to obtain than the correspondingly high gross one.

I am disappointed that the paper does not mention changing premium rates. After a substantial change in conditions, the bonus earning power of new business will differ from that of existing business. The major disadvantage of changing rates is, of course, the discontinuity between existing and new business. However, terminal bonus can be used to smooth the gap when these policies mature. I would have thought that this was a much better course of action than opening a new bonus series, with all its consequent problems of inequity.

There are many practical problems involved in declaring what one wag in my office terms 'Smaller' bonuses. There is a great danger that we fail to face up to these issues and continue with our current bonus levels in the hope that interest rates will rise again. The last five years of booming equity prices and rising dividends have helped us cling to our current bonus rates, but it cannot last for ever. In § 8.3, it is suggested that it may be feasible to maintain reversionary bonus rates at their current levels and to progressively reduce the terminal bonus rate, provided, of course, that something is also done about new business. If the assets backing the policy are very long term, and I am particularly thinking about equities, then this policy may well be feasible. However, it would require a considerable degree of cross-subsidy between generations of in-force, which indeed may be expected of with-profits contracts.

For policies close to maturity, the effect of the change in conditions on a portfolio invested in equities is to produce increased asset shares. This might encourage companies in the short term to hold reversionary bonus rates and to increase their terminal bonus rates, particularly in the light of competitive pressures. This is exactly what seems to be happening in the market at the moment, and once these profits are given away, it will then be essential to reduce reversionary bonus rates.

The author mentions in § 8.5 that in view of the adverse publicity surrounding a cut in bonus rates, there may need to be concerted action by a group of offices. It has been suggested to me that such action would be viewed by the Office of Fair Trading with disfavour. However, I would hope that competition from unit-linked life offices and by other saving media would satisfy the O.F.T. that these competitive pressures prevented such action from being against the interest of the consumer.

I would stress the importance of §§ 9.2 and 9.3. We must not shy away from reducing reversionary bonus rates just because it is unpleasant and difficult. Redington's 1981 paper (*J.I.A.* **108,** 361) drew an imaginary picture of an actuary during the 1930s under intense pressure to cut bonus rates, but who failed to have the courage to do so—he was saved by the war. We need to have the courage to do so.

**Mr H. W. Froggatt:** There are many possible methods of distribution for with-profits business. The bonuses which result depend to a great extent on the way in which it is decided that a policy should share in the investment return on a life office's assets. An important characteristic of with-profits business is that a portion of the benefits, namely, the sum assured and declared reversionary bonuses,

is guaranteed. The guarantee becomes more determinate as maturity approaches and further reversionary bonuses are declared. Leaving aside for one moment the existence of an estate, you would therefore expect that for an individual policy close to maturity a large proportion of the reserve for the sum assured and declared reversionary bonus would be invested in short dated gilts. In other words, the individual policy close to retirement would have a low EBR. This would also apply to an office most of whose business was close to maturity. In contrast, future bonus loadings provide a substantial degree of investment freedom for a policy with many years to run. A large proportion of the assets can then be held in unmatched investments, which would usually, but not necessarily, be ordinary shares and property. In other words, you are probably free to do what you like with the first premium, but later on a very substantial part of both premiums and policy reserve ought to go into gilts.

These thoughts lead to modifying the concept of an equity backing ratio to one of an unmatched asset backing ratio which reduces over the term of an individual policy. The concept of an equity backing ratio reducing towards maturity or varying with other parameters of a policy was set out in the paper on Bonus Distribution with High Equity Backing (*J.I.A.* **103,** 11), which was referred to by the author.

Calculations using unmatched asset backing ratios are rather more complex than those underlying the examples in tonight's paper, which use a constant equity backing ratio. Nevertheless, it is possible to obtain useful results by starting at, say, 100% at entry and reducing uniformly to, say, 0% by maturity. In setting the scale it is necessary, as has been implied by the opener, that the matched and unmatched assets for individual policies add up to totals consistent with the office's actual investments and are consistent with its actual investment freedom. Of course, an unmatched asset backing ratio or an EBR of 0% at maturity would not mean that there were no equity assets backing the contract at that time. Any part of the investment return earned on the assets deemed to back the policy which had not been distributed as reversionary bonus would be in unmatched assets—probably equity type investments.

There is a unit-linked analogy to the reducing unmatched asset backing ratio approach. Premiums for an individual policy can be considered to be invested in two funds; an unmatched equity fund and a matched fixed interest fund. Early in a policy's term nearly all the premiums are invested in the unmatched fund. The units are then progressively switched and premiums redirected into the matched fund as maturity approaches in order to achieve the required equity backing ratio. There would need to be separate matched funds for policies with different maturity dates.

In § 4.6 matched gilts are referred to. However, the matching is of gilt redemption date to policy maturity date, which is not the same as absolute matching of asset proceeds to liability outgo, nor is it the same as any of the different versions of immunized matching, which an office might wish to use in calculating the proceeds arising from the matched assets.

**Mr B. H. Shaw:** It is interesting to see in Appendix 5 a formula for the calculation of terminal bonuses based on an asset share approach. I do not recall previous publication of such terminal bonus formulae in actuarial literature. In § 2.6 the author sets out three ways of expressing terminal bonus. My own office uses a fourth—a scale based on the premium or, for endowment assurances, on a notional premium equal to the sum assured divided by the term of the policy. A scale is developed by calculating the approximate appreciation/depreciation of the premium paid in each year, according to the capital value performance of the fund during the year, allowing for new money invested. An accumulation process then readily leads to a scale showing total capital appreciation of premiums paid in any year up to the current year end. A final scale is then declared after a suitable smoothing process, and after deductions to allow for capital gains tax and other margins. I believe a scale relative to the premium, or notional premium, is an appropriate method and, for example, has the sense of being readily applicable to single premium policies by just looking at the one factor according to the year the premium is paid.

Redington's paper (*J.I.A.* **108,** 361) emphasizes that an ordinary reversionary bonus based on 'normal' surplus plus terminal bonus based on investment values may not be a sufficient analysis of the position. In particular, Redington posed the matter of the reverse yield gap, both as to the loss of income in the early years and in later years the treatment of the very high dividend yields on equities

invested many years before. To what extent should this gist emerge, or to what extent should we attempt to attribute surplus more theoretically between 'normal' and 'terminal' distributions to policies of different generations? Back to the flock and the sheep. This has a particular relevance to the author's paper. If yields fall on new money, should we be declaring uniform reductions in reversionary bonuses, or should older policies' bonus rates be sustained by the very high dividends on previous equity investments, with new bonus rates for new entrants? This is a profound problem. If we go too far in the one direction, we might as well have issued a unit-linked policy; if we adopt the 'broad brush' approach we are in danger of inequity between different generations of policyholders. An appropriate 'somewhere in between' seems correct.

This leads me to wonder whether we are far too hung up nowadays on the declaration of a rate of bonus. What matters to the policyholder is not the press announcements and advertisements of a declared rate. What matters to him is the bonus notice he receives each year showing the bonus added for the year, together with the accumulated total, and the understanding that he is obtaining a reasonably fair share of surplus, bearing in mind the 'pooling of investment risks' concept. Are we using modern computer and information technology power sufficiently, or are we still too hidebound by surplus distribution methods engendered years ago before that power was available? The declaration of a rate of $x\%$ of the sum assured plus $y\%$ of attaching bonuses, as described by the author, is already more than halfway to this concept. After all, next year it could be $a\%$ plus $b\%$, and '$a$' may be less than '$x$' but '$b$' greater than '$y$'. Some policies might get more than last year, some less, depending on the relative values of '$x$', '$y$', '$a$' and '$b$'. In following this scheme we are moving towards a scale of reversionary bonuses dependent on year of entry. Remember, typically, that we do not declare a rate of terminal bonus, rather we have a scale. A single simple or compound reversionary bonus rate lacks flexibility and accuracy.

The 'non-declaration', if I may call it that, of an official single rate of bonus would make it easier to make variations according to conditions, with the use of the bonus notice for explanation to policyholders. It would also usefully open up the whole question of bonus quotations for new business, another vexed subject, about which I would only make the comment that it is my belief that as the actuary is responsible for declaring the rate of bonus additions to policies in force and is the person who knows the strength of the fund, so he must have an implicit responsibility for the prospective bonus addition produced by the office for new policies.

**Mr E. B. O. Sherlock:** The author addresses his paper as much to the insurance industry as to the profession—I quote from § 1.12—and elaborates on particular difficulties in relation to life office illustrations in Section 8 on practical problems. I thought, therefore, it might be appropriate, if I were to report on certain steps which have been taken.

The current code of practice relating to life assurance selling, accepted by all members of The Life Offices' Association and recommended by the Department of Trade and Industry to all life companies in the United Kingdom, requires that illustrations shall not be based on unrealistic assumptions and that the nature of the assumptions, e.g. current bonus rates, should be made clear. The code also requires that a warning should be sounded that future bonuses depend on future profits and cannot be guaranteed.

For the last 15 years certainly there has been the feeling that interest rates were at an historically high rate and were more likely to fall than rise, but they continued to rise for most of that period. The degree of concern expressed about illustrations has, however, grown very considerably in the last two or three years with criticism from within and without the industry. It was decided, therefore, to review the operation of the code some two years ago and it emerged that there was an admirable level of adherence to those parts which could be clearly tested, namely, whether assumptions were stated and appropriate warnings given. It also emerged that some companies clearly felt that the standard cautionary wording was inadequate. Indeed, some have so qualified their illustrations that it has been suggested that the illustrations themselves have become also meaningless. A small working party was set up jointly by the industry and the profession to review the survey. As a consequence of that work, an industry-based working party was set up to take the matter forward and in its first report it set out some criteria against which a number of possible projection methods might be considered. That

report was sent to the profession to consider any possible professional implications. The appropriate Committee has only just met and we await its considered conclusions with interest.

I would like to add some personal comments, primarily from an industry rather than a professional point of view. The first, relating directly to the paper under discussion today, is that I am quite clear that the actuary has a major role to advise the Board in relation to bonus declarations, interim and terminal rates of bonus. I do not think, however, that we should lightly put upon the appointed actuary a major responsibility in respect of bonus illustrations. In particular, I think it is most unwise to interpret the phrase 'reasonable expectations' in Section 45 of the Insurance Companies Act 1982, as having anything whatever to do with illustrations. Section 73 in contrast clearly does, since it refers to forecasts which are misleading. I am quite clear in my own mind that it is the insurance company, or possibly the intermediary, that should be deemed guilty of an offence, if indeed an offence is committed.

The second comment, relating to the practical problems touched on by the author, is that this matter must be tackled with some urgency, as the opener said. It seems to me that we risk on the one hand a large number of disillusioned policyholders if inflation remains in low single figures but illustrations continue to be given on a basis which requires an investment return well in double figures, because the qualifications will be forgotten. On the other hand, I cannot believe that we would be allowed to continue as at present and risk misleading those who may choose to effect personal pension policies of some sort instead of participating in an occupational scheme or the State pension scheme.

What, then, are we essentially trying to do? The first thing, it seems to me, is to translate the concept of a bonus system, or I suppose its equivalent in unit-linked business, into a comprehensive form, so that the reader has some idea of the order of magnitude of the outcome that may result. Some would argue that this should be expressed in the form of a range. Secondly, we are trying to give a measure as one of the tools, but not necessarily the only one, against which to test the comparable products of competitors in the same field. I believe we should be very careful before promoting an alternative method which eliminates real differences. Thirdly, the system, whatever it is, must enable us, as a savings industry, to compete fairly and sensibly with other savings media. I would add one final requirement myself, and that is that the system should be as simple and as automatic as can be, so that what has been done can be explained to the potential purchaser of the contract.

**Mr A. E. M. Fine:** The author has set down in §§ 2.13 and 2.14 four basic principles governing bonus distributions. Whether one accepts these principles or not, it is interesting to consider whether current practice is in line with the principles and particularly whether the first principle of the inviolate estate is adhered to in practice. In practice, the actuary in his bonus distribution policy will reflect the different interests of those concerned with the insurance operation—namely, the policyholders, shareholders and management and salesmen.

The policyholders are concerned that their reasonable expectations should be met; but what can a participating policyholder reasonably expect of his insurance company? He can certainly expect that the policy benefits at maturity will be at least as good as those indicated to him in sales literature at the time of sale unless there has been a significant deterioration in experience in the meantime. He would certainly expect a clear explanation of the reasons behind any reduction in bonus rates. He expects the company to remain strong financially, so that guaranteed benefits will be paid. He would expect to receive continuing good service from the company and expect advice on his insurance needs. He would expect to be treated fairly in relation to other policyholders, old and new, and in relation to shareholders, management, staff and salesmen of the company. Perhaps he would also expect to receive at maturity a 'fair share' of the assets, allowing for the return on the investment of his premiums (in line with principle 3).

What of the shareholders' interests? Shareholders are looking to maximize the level of dividend (i.e. the shareholders' share of distributable surplus) over a period with built-in dividend growth; or they are aiming to maximize appraisal value levels and movements in appraisal value from year to year. The management and salesmen are looking for a thriving continuing operation that is able to attract new business, builds up a good bonus track record and offers products that compare favourably with competitors. The job of the actuary in practice is to reconcile and satisfy these interests.

In practice, principle 1 (the inviolate estate) is discarded. With-profits premium rates at current levels will support current bonus levels only on the assumption of high rates of withdrawal, not borne out by experience, or of rates of investment return of the order of 12 to 14% before tax or even higher. The ability to continue to do this without diluting current policyholders' expectations depends on the existence of the estate. The estate is therefore being used in support of new policyholders in violation of principle 1. The existence of the estate and its uses in this manner gives rise to a potential point of conflict between policyholders and shareholders. Let us assume that closing the company or the particular fund to new business will lead to the estate (or part of it) being paid out by way of special bonus, say, to existing policyholders. Clearly it is in the interests of existing policyholders that the estate should be used in this way. Let us assume that we are in a 90/10 situation for share out of surplus. Shareholders will receive one-ninth of this special bonus. As an alternative to closure, the estate can be used to support future new business, which will in turn have a value to shareholders, being the present value (at a shareholders' risk discount rate) of one-ninth of the bonuses on the future new business supportable by the estate. A little bit of simple mathematics can show that more often than not this latter value is significantly in excess of one-ninth of the estate. So in these circumstances it pays the shareholders to continue writing new business and the existing policyholders to cease writing the business.

How do I see the near future for participating business, assuming an era of lower interest rates? As always, an office might be constrained by its actuarial reserving basis and its ability to change that basis. However, putting that consideration to one side, I suspect that offices, with the competitive nature of the market in mind and having regard to what the market can bear, will continue to use up some of their estate in support of future new business. Offices with the largest estates are in the strongest position in this respect. Others in a less strong position will adopt the practice of either increasing premium rates or closing off existing series and starting new ones, possibly with a new and less easily comparable bonus structure, such as the reparticipating system suggested by the author. Also, we are likely to see the increasing use of unitized with-profits funds with annual bonuses, and a deliberate switch to selling unit-linked policies. A recent indication of this is the increasing number of unit-linked subsidiaries and authorized unit trust management company subsidiaries formed by conventional offices.

**Mr C. J. Hairs:** In Appendix 5 the author sets out a very straightforward method for calculating terminal bonuses based on the asset share approach, albeit I agree with an earlier speaker, who pointed out the need to have regard to other sources of surplus. This asset share is the accumulation of the investment portion of the premiums using the total rate of investment return obtained on the fund from year to year, namely, both income and capital gains, whether realized or not. This approach is very powerful and I commend it to any office not already using it. Of particular interest is the series of figures, '$i_r$', representing the actual historical investment performance of the fund.

When discussing the significance of asset share figures, the bald numbers can be a bit lifeless. It is helpful to calculate the average yield on the invested portion of premiums that the asset shares represent. This, of course, is equal to the weighted average of the office's actual investment experience over the term of the policy, and is given by '$i$' where, using the author's notation,

$$\sum_{r=1}^{n} (IP_r)(1+i)^{n-r+1} = \sum_{r=1}^{n} (IP_r) \prod_{s=r}^{n} (1+i_s)$$

For an office which is using asset share as its basis for achieving equitable bonus distribution this measure of average yield underlying asset share can be most informative and, in particular, it can highlight many of the problems facing the life insurance industry over the next few years. I will try and illustrate this with the following outline examination question which I bequeath without charge to the examiners for a future paper in advanced life office practice:

> The business of a U.K. Mutual Life Office consists entirely of 10 year and 25 year with-profits endowment assurance policies. The bonus objectives agreed between the actuary and directors of

the company are to return to the maturing policy its asset share generated by the investment portion of the premium, proper charges having been made for risk and expenses. Departures from these objectives are allowed in order to absorb short-term fluctuations in investment experience, but these departures should be kept to a minimum. The office invests roughly 50:50 between fixed interest and equity securities.

As newly appointed actuary to the company you have reviewed the asset shares associated with policies maturing 10 years ago, 5 years ago and now. These asset shares can be represented by average yields over policy terms as follows:

| Policies maturing | 10 year term | 25 year term |
|---|---|---|
| 10 years ago | 11% | 9% |
| 5 years ago | 18% | 12% |
| Now | 14% | 13% |

What structures of normal, special and/or terminal bonuses do you feel would have been appropriate for this period? Discuss the implications of the different approaches available to you, making brief reference to any further information you require.

In drafting this question I am trying to look ahead. Apart from allowing sufficient time for the author's paper perhaps to become part of the course of reading, so that students may have the advantage of his work in answering the question, I am allowing five years for such a yield history possibly to be fully relevant. I have in mind the examination for 1990, or thereabouts.

The figures for '10 years ago' would, I believe, be not untypical for policies maturing at the end of the 1970s. Although investment experience will have fluctuated from year to year, especially as between 1974 and 1975, we see the result of steadily climbing interest rates and equity performance over a long period. Naturally, after such a period of increasing yields the average yield for shorter-term maturing policies—the 10 year policies—will be higher than for those with a longer term.

The figures for '5 years ago' are not untypical of our current situation, halfway through the 1980s. Some very high levels of investment performance have been achieved over the first half of the 1980s. The effect is, of course, particularly marked for shorter-term policies in terms of the average yield.

The figures I have labelled 'Now' are actually looking ahead to the end of this decade. They assume that yields over the next five years will be around $12\frac{1}{2}\%$ per annum, which did not seem to me to be wholly unreasonable. The particularly interesting feature here is that for maturing shorter-term policies, the average yield underlying asset share shows a large drop from five years previously, whereas that for longer-term policies shows an increase.

What we are seeing here is the effect of what might, in future years, be called the early 80s 'investment return hump', as significant in its way as the 1974 asset slump. Managing bonus structures to allow the benefits of this hump to pass equitably to different generations of policyholders is going to be one of our challenges over the years to come. The author has pointed out several techniques which can be applied and I believe his techniques are up to this task. I am confident in the ability of life office actuaries to reach appropriate solutions to essentially similar questions, each in respect of their own particular office.

However, the sample examination question failed to mention one thing. I could have added that the office is doing business in a market in which illustrated maturity values based on a projection of current normal and terminal bonuses are given great significance. Indeed, organizations have been set up which make it their business to prepare league tables showing the top twenty for whole ranges of policies and an office's league table position is of great significance to its marketing thrust. At this point, in spite of examiners' alleged propensity to ask questions to which they would love to know the answer themselves, I believe the question becomes too hard for the student.

The industry is, of course, now in the position of having to answer such a question, and the author has touched on the matter in Section 8 of his paper. I support him in his belief in §8.5 that the individual office is hemmed in by competitive considerations. Other speakers have referred to the urgent need to get away from this practice. I understand that moves have been put in hand, but I would just like to refer to one particular aspect. To a wholly unwarranted degree, the present practice on illustrations constrains downward adjustments in bonus rates. Take the office for which the

actuary feels that a reduction in normal bonus rates of only $\frac{1}{4}\%$ is appropriate. Now, it would be perfectly proper that such office should show a relative worsening of its competitive position of $\frac{1}{4}\%$ in the values of currently maturing policies, and the actuary would expect to discuss this with his marketing colleagues when he is preparing his recommendations. What is quite inappropriate is that the office's position should be shown as worsening by nearly 6% in the league table of projected results for 25 year policies as a result of this $\frac{1}{4}\%$ change. The prominence given to such league tables will mean that our marketing colleagues will feel obliged to resist most strongly even so small a change as this. Unless some break from the impasse is found, we could see on a worst possible view maybe, a considerable test of nerves developing, each of us waiting for some other office's nerve or solvency to crack. Perhaps those of us devoted to *laissez-faire* capitalism will see nothing wrong with this scenario. I, however, would be concerned at the loss of future risk-bearing capacity to the U.K. while offices ran down their estates in the course of such an unnecessary bonus war.

This objection to the current practice would apply with similar force to any alternative approach which simply substituted for the present system the use of illustrations on the basis of some percentage of current bonus rates, this percentage being standard across the industry. Even if such an approach produced a so-called more realistic estimate of maturity values it would do nothing to reduce this hypersensitivity to bonus rate differentials to which I have just referred.

I would like to suggest that in developing a revised approach one further criterion to include should be that:

> The approach should not be such as to constrain unreasonably in marketing terms an office's willingness to reduce bonus rates when it seems right to do so in financial terms.

Such a criterion, and most others I can think of, would in my view be satisfied if the market for traditional policies moved to an approach for future illustrations similar to that now employed for unit-linked business. In other words, we project the results of two or three different assumptions about the future total investment return achieved in respect of what might be called the investment portion of the premium rates. While even this approach is not without its problems, such problems seem to me essentially technical rather than fundamental. This approach would largely take future illustrations out of the inter-office competitive arena. Offices would compete on the basis of past performance, which has the massive benefit at least of being factual.

**Mr S. P. L. Kennedy:** I have a particular interest in this paper for two reasons. Firstly, I was one of the authors of the paper on Bonus Distribution with High Equity Backing (*J.I.A.* **103,** 11) which was discussed in this hall nearly ten years ago. Secondly, I work in close proximity to the author! So it is perhaps not surprising, and indeed to me it is very encouraging, that some of the concepts in our paper ten years ago are now used and developed in his paper.

One such concept has already been referred to and that is the Equity Backing Ratio, or EBR. However, in §4.12, the author redefines the EBR in terms of the guaranteed benefits and the guaranteed assets, and that is a fundamental difference from the definition in our paper. His denominator 'R' is the reserve on the published valuation basis for the sum assured and declared reversionary bonuses and takes no account of terminal bonuses. His numerator is consistently expressed in terms of the reserve for sum assured and declared bonuses less the guaranteed or gilt assets. This has the effect of including only part of the equities in the EBR; the remainder are, of course, available to cover terminal bonuses or presumably to go into the estate. I do not quarrel with the author's use of this function for the purpose for which he uses it, but it is not the EBR, and it does give a misleading picture of the fund. On reflection, I think that the definition we had in our paper was less than perfect, too. I would now prefer to define the EBR as the ratio of the equity assets to the total asset shares of the with-profits policies—E/AS to use the author's notation, where 'E' is the equity assets. The EBR thus defined, which is traced to the definition in our original paper, is considerably higher than the author's when terminal bonus is high, and terminal bonuses are high at the moment. Thus the EBR for the 25 year policy on a 50/50 model is 50% on his definition, but it is 70% on mine, and I think the investment manager would think of his fund as 70% in equities and not as 50%.

As a result of this, I have suggested to the author that the confusion would be resolved if he were to

use the complement of his index, that is, the gilt content over the reserve, and call it the Gilt Reserve Ratio, or perhaps more descriptively, FIBRR, the Fixed Interest Backing Reserve Ratio. As the actuary of the fund, what he is really interested in is this Gilt Reserve Ratio. He is interested in the guaranteed backing for the guaranteed benefits, and the rationale of § 5.7 is that he is not going to let the guaranteed backing or the guaranteed benefits fall below some percentage—50%, 30%, or whatever figure he decides on.

**Mr M. Iqbal:** I think one has to go back to the 1960 paper by Norman Benz (*J.I.A.* **86,** 1) to find another which tackled an urgent professional problem with severe commercial implications. Benz looked at the problem of distributing the gains made by life offices following the emergence of the reverse yield gap. The author looks at the problems that have arisen a quarter of a century later when years of climbing interest and bonus rates have suddenly been arrested—at least the interest rates rise has been arrested.

It is a great pity that he has chosen a very simplistic model to make his case. It is not really good enough to look at a single block of policies in isolation. I think we have to consider a model office with a substantial portfolio of existing business. Indeed the rate at which the office has been expanding relative to its in force business is a crucial factor to be taken into account. This fact was brought out in a 1980 paper by Carr & Forfar to the Faculty of Actuaries (*T.F.A.* **37,** 91), which the author has ignored. Allowance also needs to be made for the pattern of withdrawals, the volume of non-profit business and, very importantly, the volume of unit-linked business in the portfolio. In short, what is required is a detailed cash flow projection comparing income and outgo.

There are two separate problems here and it is instructive to consider them separately. The first is the question of what is the correct rate of bonus to declare to existing policyholders of various categories and generations. The second is, what rate of bonus should be declared in respect of new business? I would like to take the latter first.

The author is correct in stating that the current level of compound reversionary bonus is far too high under the present and likely future investment conditions. What we need to do is to reduce the projected benefits we are illustrating to prospective clients. The author has advocated a two-tier bonus rate along the lines recommended by Skerman in 1967 (*J.I.A.* **94,** 53). I do not think that this in itself will be of much help unless we take the hitherto unthinkable step of actually cutting the rate to more realistic levels. If we are prepared to do that, then a number of other possibilities open up. We need to make sure that the new system gives us more flexibility than the present one. We do not want to find ourselves, twenty years hence, in the position that we are in now. I suspect that even a two-tier rate will in due course become rigid.

For this reason I adhere to the view that Redington expressed in the discussion on Skerman's paper. The rate of reversionary bonus should be fixed at a level that can be supported by the premium rate on a conservative long term interest assumption, which for this purpose I would regard as 7% to 8% p.a. gross. The terminal bonus rate would then be used to make sure that the outgoing policyholder received his due share in aggregate. This system gives considerable flexibility. However, as a cut in reversionary bonus rates has considerable anti-sales implications, the practical solution would be to increase the premium rate to the correct level for new business. This introduces a sharp discontinuity, which I think is inevitable, given our present position. So far as the existing policyholders are concerned, I do not suppose it matters much to them what label we attach to their maturity proceeds so long as they receive the correct amount in aggregate, which is why I feel it is more important to decide what we want to do for new business before looking at distributions for existing policyholders.

I will now turn to my main concern, which relates to the position of proprietory offices. The profession is very coy when it comes to discussing proprietory offices and the author has not tackled it at all. Yet it raises issues of fundamental professional importance and I think we cannot really choose to ignore it for much longer. Typically the proprietors get 10% of the declared cash surplus. If we accept that actuaries have let the reversionary bonuses rise to too high a level, we are tacitly admitting that we have overdistributed surplus to the proprietors in the past. That may or may not be true, but we are tacitly admitting it. This would be true whether the correct bonus structure was the author's

two-tier basis or the basis that I propose, although the overdistribution is greater under the latter. The solution for future business of increasing the premium rates, whilst feasible for a mutual office, will make matters worse for a proprietory one. In my opinion, the theoretically correct solution is to reduce the rate of reversionary bonus by something in the order of 10% to 20% and concurrently increase the terminal bonus, so that overall the proceeds are of the correct amount. The snag is that this would involve a 10% to 20% cut in dividends, other factors being equal.

There are two other technical reasons for arguing that actuaries have overdistributed dividends. Firstly, whilst bonus rates are determined by means of a bonus reserve valuation, the cash cost of such bonus and the proprietor's share is published on a net premium valuation at a much lower rate of interest. The proprietor's share could rise from a notional one-tenth to an effective one-eighth or one-seventh on current reversionary bonus rates. Secondly, whilst their own share is taken out of the long term business fund, the proprietors continue to share in the further surplus generated by the policyholders' share which is left in the fund.

To summarize, the system of rewarding the shareholders of a with-profits office is completely wrong. The lesser the risks they take, the bigger the bonus loading and the actuarial surplus and, in consequence, the bigger the shareholders' profit—the very opposite of the normal risk/reward ratio. In this age of uncertainty, it is prudent to give less guarantees to policyholders, but we must do it in a way that does not give the shareholders excessive rewards. I think that further research is required in this area. I hope that the Institute will take the initiative in this. For my own part, I am happy to sell a much lower reversionary bonus and much higher terminal bonus to my sales colleagues, provided that someone else is prepared to sell the consequences thereof to the shareholders.

**Mr G. D. Clay:** In § 1.7 the author says: "The real nub of the problem appears to be the expectations being generated in the minds of prospective policyholders by the market generally". In § 2.15, the author says: "Equity is an elusive concept in the context of life assurance business". I entirely agree with both these comments, and indeed various other speakers this evening have touched on the conflict between equity for existing policyholders and the expectations we generate in prospective policyholders. As the author indicates, offices are becoming increasingly cautious in what they say. Nevertheless, what do the policyholders really expect? I believe that the industry and the profession must address this problem if we wish to justify our claim that with-profits policies provide some sort of equity.

I think this leads on to a very major point, namely, that we have got to distinguish between the claim values we pay to existing policyholders and the bonus rates we choose to project to prospective policyholders. If we do not break that link we are walking around in a straitjacket and I am afraid that we are going to trip over ourselves very shortly.

My second point is that the paper concentrates on a very reasonable but comparatively simple model of a fall in interest rates coinciding with a rise in equity market values in an environment in which equities consistently out-perform fixed interest assets. The author then deduces various implications for the real world in which we operate. I entirely support the approach adopted, but I feel that one significant factor has been overlooked. Over the last few years, equity investments have out-performed fixed interest ones by far more than the model, or any prudent actuary projects for the future. I believe that this factor merits separate and prior attention. It cannot be considered independently of the postulated fall in interest rates, for the effects must interact, but it does have distinct features.

Abnormally good historical investment performance cannot affect expectations for future performance. Hence the proceeds must be distributed by way of a special bonus that is not projected for new policies. The choice between a terminal and reversionary bonus is not clear-cut. Some offices have declared one type of bonus, some the other, and some offices both, generally in different years. Provided an office accepts the concept of special bonuses, the normal terminal bonus is no longer needed as "an essential ingredient in arriving at fair shares for different generations of policyholders" (§ 9.1.1). Its sole justification is "protecting the office against adverse market movements" (§ 9.1.1). The conclusion is that a fall in investment returns cannot satisfactorily be handled by a cut in terminal bonus; it must be followed by a cut in reversionary bonus. This is a stronger form of the point made in § 9.1.2.

My contention seems very straightforward and, to me at least, logically impeccable. However, it is predicated on the assumption that you can distinguish between, on the one hand, abnormally high achieved investment returns and, on the other, a change in the environment which justifies you in predicting increased returns for the future. I think this is the nub of the problem, because the actuary is under marketing pressure to bolster new business projections. Hence, there is a tendency for 'special bonus' to leak into 'normal', i.e. 'projectable' bonus.

The author advocates a system of repartition. I have referred to it before as super-compound bonuses. I have had considerable experience of these in the South African market, where many offices also declare terminal bonus in a form that he does not mention in the paper, i.e. as a percentage of accrued reversionary bonus for each year in force. The projected benefits follow a very steep exponential curve and promise far more than is actually being paid at the moment. I wonder perhaps if this is something to do with why the author suggests in §9.1.3 that the market would prefer a widening in the differential between the rates of bonus on sum assured and bonus on bonus? I suspect that in this context 'the market' means 'intermediaries', who might understand bonus rates, not 'policyholders', whom, and here I am in full agreement with the previous speaker, I am sure only look at projected or actual maturity values and really are not interested in how we have done our arithmetic and come to that answer. I therefore support one of the earlier speakers, who said that we have a hang-up on bonus rates—policyholders do not!

I think it is very confusing for the Equity Backing Ratio to be defined in such a way that some of the assets are left out. We pay claim values out of market values and I would therefore suggest that the Equity Backing Ratio should be based on market value and not that funny thing called a 'published reserve' for sum assured and reversionary bonuses.

**Mr N. B. Masters:** I would like to concentrate on what I regard as a fundamental area, but which is only briefly referred to in the paper, namely, the role of the estate and of marketing forces in shaping bonus strategy. The balance between an office's estate and the continuing ability of that estate to support new business is central to the control of any with-profits office. Whether that initial support is fully recovered subsequently can only be established with hindsight and to an extent is secondary to the current problem. The essential question is whether the support for competitive bonus rates in the immediate future will so erode the free reserves of the office that a severe cutback in new business activity in the longer term becomes inevitable.

The financial strength of offices in this country varies greatly. For the largest life insurers there has been little or no erosion of the estate taking place because of the gearing effect of real growth on their free assets in excess of their growth in new business. They can be expected to maintain their bonus levels quite comfortably into the foreseeable future if new business does not expand dramatically. However, there are smaller offices where the continuing support for competitive with-profits premium rates and bonus levels is beginning to make significant inroads into their free reserves. I suspect that in some cases these small offices continue their present highly competitive stance in the vague hope that the market will eventually reach some consensus on a reduction of bonus rates, which they will then be able to follow down. I believe this will not happen, because market forces will not let it happen. These offices must recognize their own relative weakness. They need to seek a new direction, but what direction? If an individual office significantly reduces the financing of with-profits business, its product will rapidly become uncompetitive and market forces will ensure that the volume of new with-profits business will fall away sharply. If nothing is done, overheads will replace bonus costs in eroding the estate. Consequently, it is not enough simply to cut bonus rates. Offices will need to look for fresh strategies to maintain their new business volumes without heavy calls on their free reserves. Proprietary offices may seek new capital, but shareholders will not wish to see their funds supporting with-profits policyholders indefinitely. The fresh approach may take the form of new product mixes, with a greater emphasis on single premium and unit-linked business, different methods of selling may need to be considered, or a more fundamental restructuring may provide the best answer. The solution will depend on the individual office; but whatever action is taken, there can be no doubt that if an office cannot see itself maintaining its present bonus rates for as long as current conditions may hold, action of some kind is essential before that office's finances are permanently damaged.

**Mr J. G. Jewell:** The author emphasizes that the nub of the problem is expectations. His pointers to the appropriate management of modern bonus systems in the conditions he is concerned about—I know he would object if I said "the conditions that he expects"—are in themselves a valuable contribution to understanding underlying financial mechanics.

First of all, I should like to touch on investment prospects, because I believe actuaries' expectations in this respect are relevant to the urgency with which action may result. Redistribution of wealth has been going on in the U.K. economy and, I believe, in other O.E.C.D. countries, for a very long time now, from the extreme capitalists towards the smaller saver. Financial institutions such as ours may mediate for the latter, but the ultimate ownership is what counts. Capitalists had little choice between saving and consumption. Savers, at the extreme, most certainly do, and in our modern consumer society the price that they demand to defer consumption and indeed the price that they are willing to pay to accelerate consumption is extremely high. It may well have some content of inflationary expectation, but I would suggest that the real rate of return demanded is high and it is my expectation that it will remain so. World unemployment needs high levels of capital investment if it is to be solved, and politically, at least, I believe there will be a growing force on this demand side of the world capital market. The U.S. budget deficit is a thoroughly de-stabilizing factor. Importing the world's savings and exporting inflation, was how Chancellor Lawson very recently put it, and how apposite. In the short term it may address American unemployment on the lines I have already commented on. As the Reagan administration seeks to ride this tiger, one look over the abyss of recession will cause them to steer as best they can for the softer landing of future inflation.

So if I can postulate no significant further fall in monetary returns—and I would emphasize that I only postulate it for the sake of this discussion—no doubt others will do too, perhaps with more conviction and will seek that comfort. For the pain of reducing reversionary bonus rates seems too severe in relation to the apparently modest erosion of bonus earning power writing just one more year's new business at current rates. Let there be no doubt that current new business, taken as 1984/85 to date, is already being subsidized more than its due at the rates of interest that have prevailed over that period. Also, as the author points out, investing heavily in variable investments may hold out prospects of eventually getting the returns required, but the route of high reversionary bonus rates is simply not in accordance with the principle the author puts forward as his fourth principle in § 2.14 that the form of the bonus distribution should have regard to the manner in which the assets are invested. We all seem very ready to draw upon the estate. I have heard no suggestions as to how we are going to fund it.

Ten years ago, in the working party on bonus distribution from funds with a high equity backing and in the discussion here on the subsequent paper, I ventured to suggest that it was time to start informing our policyholders. I do not accept that this is a new business problem. It is not just an illustration and quotation problem. This is a fundamental problem of communication with our policyholders. Some exploration of the relationship between investment return and bonus prospects might help towards a more educated response to change. Publish a Valuation Balance Sheet—any Valuation Balance Sheet—with suitable commentary. Let us stop clutching the problem to the cosy confines of Staple Inn Hall and let us start accounting for our stewardship to the people to whom we should be accountable, namely, the policyholders.

**Mr H. D. White:** I read the author's paper with interest, as I have looked at this problem using an Ordinary Branch profitability model. My model allows for alternative investment strategies to be considered. When I first produced some results on a fixed interest basis I was appalled to see what high returns were required to support current bonus rates. Even if they reverted to the highest levels for fixed interest at the end of 1982, it is going to be difficult to justify current bonus rates, but the maturity values can be justified by a high equity backing ratio and in some offices this must exceed the 70% of the with-profits fund suggested in § 4.7 to pay their bonuses.

If you have a high equity backing ratio and you continue to have a traditional reversionary bonus on a compound system, you are infringing the fourth principle that the author suggests, that the form of the bonus distribution should have regard to the manner in which the assets are invested, because the profits from equities start accruing very slowly and the interest in the early years is small. So the

two-tier bonus system in current conditions would be much more suitable than the existing one: you would have a much lower basic rate of bonus on sum assured and a higher rate of bonus on bonus. This is all right so long as conditions remain the same, but if we have the present situation, where we have high bonuses at the moment on existing policies, which have not been earned because of the initial expense problem and low equity dividends in early years, and if there is a further fall in interest (there is a certain amount of inertia before a decision is made to change the bonus rate and the existing bonuses then are well in excess of the bonuses which should be accruing to the policy) in this circumstance, the suggestion that there should be a higher rate of bonus on bonus and a reduction in bonus on sum assured does not help the situation. In fact, it is clearly inappropriate to pay a higher rate of bonus on existing bonuses which are already too high. How is the industry to provide for these high bonuses if there is an even further fall in interest rates?

We looked at the problem, assuming an equity backing ratio which started at 100% and reduced as the policy approached maturity, but overall we assumed an equity backing ratio of about 70%. Our model also included an appropriate allowance for expenses and an allowance for one year's inertia before bonus rates were changed, and though these two items may have exaggerated the difference in the results, we got distinctly different results from the author. The main reason for the difference in the results was the assumption about what was going to happen in the future. The author's fourth section assumes that if there was a reduction in interest rates there would be an appreciation of equity assets. This might not happen, and there is a whole variety of things that could happen. He also assumes that equity income would continue to increase in future. These are quite possible hypotheses, but we could consider alternatives which are equally possible. Conditions could revert to those found in between the wars, or immediately postwar, when a higher yield was expected from equity investments than from fixed interest investments due to the risk involved in equities. The second alternative is that equities will continue to reflect the value of the assets that support them and there will be no appreciation or depreciation. Or we could make a third hypothesis that the Government might succeed in completely controlling inflation, dividend growth might cease and then the office could not support its overgenerous past bonuses simply by continuing to hold its existing assets.

The conclusion that we came to was that rather than a higher rate of bonus on bonus after a fall in interest rates, on our investment assumptions we would expect to have a lower rate of bonus on bonus—perhaps even a simple bonus. If the assumptions we made and those that the author made can be considered to be reasonable, then what can we learn from the difference in results arising from two broadly similar investigations? The answer is that the existing rates of compound bonus declared by most offices are not appropriate to an investment policy with a high equity backing ratio. If we can have such an investment policy, bonuses in the early years should be low to reflect dividend income actually received. In later years, bonuses should increase when equity growth is achieved. This implies a lower rate of bonus on the sum assured and a higher rate of bonus on bonus in current conditions. Thus, if interest rates fell, reversionary bonuses would reflect the profits actually earned and future bonus rates could then reflect current conditions.

At present, under the existing bonus system, there are also some anomalies between policies of different terms. As a result of the high rates in early years, some companies appear to be subsidizing the short term business at the expense of the longer term business. This is undesirable, as it is the longer term business which should lead to the long term financial stability of a traditional office, though it might have the opposite effect on a unit-linked office, if they get their sums wrong.

If conditions remain unaltered, we as an industry should move to lower rates of bonus on sums assured with a corresponding increase of bonus on bonus.

I would like to make a few points on the sixth section relating to pensions business, with which I agree. Existing traditional bonus systems are more appropriate for longer term level premium business than pension business. Yields on short term pensions products are highly sensitive to changes in the bonus rates. Single premium business may also cause anomalies. There are substantial cash options and annuity guarantees that could become onerous. As a result of these factors and the gross tax position the author mentioned, if there is a fall in interest rates, the problems that arise on pensions business could be much more acute than those on ordinary life assurance business. The solution for pensions business might be to close existing bonus series and open new ones offering higher bonus rates based on lower guaranteed sums assured.

**Mr H. H. Scurfield** (closing the discussion): The paper is concerned with bonus strategy and emphasizes the expectations which new policyholders are given, either directly or by implication. As has been said by many people, it is a timely paper because it deals with a subject which is so topical within the industry and indeed the profession. I think that now we have been asked for our advice, we need to give advice as a profession which will stand the test of time and build upon our reputation.

The paper starts with reference to Mr Tinckler, in 1976, and asks whether much has changed since then. I think there have been changes since then, because the expectations we are giving to policyholders are very much greater now, whilst the expectations in terms of investment conditions for the future are certainly no greater now than they were then. So Mr Tinckler's comments in those opening sections have increasing force now.

There has been the general fear expressed today that the current practice of new business illustrations showing much higher values than current payouts will not only damage our industry, but will also drag down the reputation of this profession, and that was referred to by the opener. Quotations are issued with a qualification and sometimes we are told that it is on the back, but the qualification is that they are using current rates. The unsuspecting policyholder is not told that using current rates projects answers which are very much higher—30%—sometimes 40% higher—than current payouts. I believe this to be very misleading to our lay policyholders. We all know that it is going to be very hard to maintain the current level of payments into the future. Why indeed should we imagine that we are going to be able to achieve a great deal more than we have in the past, when we have gone through this period of historically high interest rates and capital growth? In the past we have been cautious and the eventual outcome has exceeded our projections by an enormous amount—occasionally by $2\frac{1}{2}$ times—but that should not give us any satisfaction when we look forward. I believe that we should come to our senses both as an industry and as a profession and that we should advise ourselves to stop using bonus projections on the basis of current rates, or indeed, as a percentage of those current bonus rates. To come up with a basis which is simply a slight percentage down on current rates does not help the comparison between companies at all. Past performance is the only objective comparison between companies and that is the only verifiable fact.

Mr Sherlock talked about not eliminating differences when it comes to illustrations. Yes, of course, the companies which are performing less well would like a standard basis for all companies. On the other hand, those who are performing better will want to use a basis which reflects their better performance in the past. But in using past performance we need to give a warning. How, I am not sure, because whatever warning we put out, we cannot be sure that the brokers will use it. However, we do need to give a warning that the future does not always reflect the past.

The unit-linked offices have a standard basis and I believe that the unit-linked offices give us a lead as to the way we should proceed. Like Mr Hairs, when looking forward I think we should give more than one projection, to emphasize the uncertainty of the future.

I was not quite sure what Mr Sherlock was implying, when I thought he said that the actuary had no responsibility for the actual illustrations used. Clearly the actuary is responsible to the Board, not for the illustrations, but for the financial soundness of the company and the bonus rates. I believe that the actuary also has a very strong role in regard to the illustrations being issued and indeed for advising the Board as to the implications of the illustrations that are being used.

Will bonus rates really have to come down? I would like to look at that in two separate ways. First of all, will payouts have to reduce? Although there was one rather optimistic speaker, I think the general feeling was that over the next few years at some stage payouts will have to come down. We have had these historically high interest rates. Assuming that the policyholders have had their fair share of the assets in the past, and that we are going to continue giving them their fair share, then as interest rates come down payouts must come down. Mr Hairs pointed out that the reduction might well vary in time, according to the term of the policy. If we have a 25 year contract, it will obviously carry with it the good investment conditions of the last 10 years for some 15 years into the future, whereas a 10 year policy will not. We must envisage that payouts can and will come down at some stage; but this is not the worst of it: a continuation of current bonus rates usually produces projections very much higher than current payouts. So not only will payouts come down, but projections will have to come down to the level of payouts and then come down even further. Of course, bonus rates must eventually come down.

Mr Fine and Mr Masters implied that many offices are having to use their estate, to subsidize current payouts, especially the smaller companies. Mr Masters thought that might lead them to becoming a linked office. That is interesting, because to make the suggestion that we are using up the estate at the same time as the linked offices are paying more than us, seems to be a contradiction; but maybe we have not followed the investment policy or strategy of the linked office.

The example in the paper makes much use of the two-tier bonus—the simple associated with the compound. I think that that may be seen as a simplistic solution to a simplistic example, where interest rates and dividend growth are both changed at precisely the same time. In practice, the effects are more variable. The two may have some correlation with each other, but they cannot be presumed to change precisely in time with each other. Nor is it possible to be positive in the short term that a really long-term change has been made. So we cannot suddenly have a change in reversionary bonus; we need to be giving something as an additional bonus, which perhaps later we can transfer into vested bonus. We do have a lot of different types of bonus and I do not think we should theorize on which particular basis is right at a particular time. We should be prepared to move from one to the other, if necessary—a simple, or a compound, or a special, or a terminal, calculated on sum assured and/or bonuses.

The one thing that really did come through—and a lot of speakers referred to it—is this straitjacket that we put around ourselves by having to use current bonuses in illustrations. It was referred to again and again, and that is the thing that we really have to move away from.

In § 2.8, terminal bonuses increasing progressively are referred to. As someone said, they have done this since 1974, when the stock market has moved consistently upwards. In fact, there have been reductions in terminal bonuses when these have been translated into a special or vested bonus.

There was some discussion regarding § 2.14.4 and it was asked, which comes first, the bonus distribution or the investment policy? It should be quite clear that what comes first is the wish, the desire and the aim to maximize the payout to the policyholder. Then we arrive at an investment policy to maximize that payout, and then we produce a bonus distribution which will not constrain us in reaching that maximum payout; but we must start with the policyholders.

The use of this EBR—and I prefer Mr Kennedy's definition of equity assets over total assets share—led me to think back to our bonuses last year and a comparison between the advantages of a high or a low equity backing. A low equity backing implied less risk, and I was not quite sure that was always so. The high equity backing, with increased dependence on property and ordinary shares gives a low income immediately, when income is not crucial, and it should give a high income later when it is most needed. The advantage of that was that it reduced the reinvestment risk quite markedly. So even with low equity backing there is a risk due to the larger reinvestment required in the earlier years.

Several speakers referred to communication with policyholders. It is an important point, but there is a limit to what can be achieved. If we produced booklets of the size which were discussed tonight, then we should not be communicating because very few policyholders would in fact read them. However, we could do better. The illustration we send out in advance, with its over-optimistic expectations, is an example of poor communication. We are investing policyholders' money; it is a large amount and makes a very material difference to their savings and to their future prospects; we owe it to them in equity. If we are not fair—and I do not think our illustrations are—then I agree with those speakers who have said that it will catch up on us and we will regret it.

I liked Mr Hairs's examination question. I was glad I did not have to answer it! He and Mr Shaw referred to Appendix 5, and the terminal bonus calculations. It is important to understand that there are some quite considerable omissions from the factors to be taken into account, such as, profit from non-profit business, profit from expenses, profit from mortality and profit from withdrawal. We should also take into account any requirement that there may be to use any of that profit to pay a dividend. All those things are not in, and without them the Appendix is not complete. The asset share concept is a very important and useful one in trying to determine what bonus particular contracts deserve.

**The President (Professor P. G. Moore):** The paper which has been presented to us tonight is both welcome and timely. We have been through what has been commonly regarded as an exceptional period as regards investment performance, although I am reminded of the Oxford history don who

was asked to respond to the college bursar's proposal that they should make an investment in land, since, he argued, over the last thousand years land had shown a very good return. 'Ah, bursar', replied the don, 'but the last thousand years have been quite exceptional!'

More seriously, there is both actuarial and public unease as to whether current bonus rates can be maintained and hence the way in which meaningful comparative office figures can be made available. This paper highlights the complexity of the problem and the careful thought necessary to give fair and reasonable expectations in a market economy.

The quality and quantity of discussion indicates how much the Institute is in the author's debt for writing such a contemporary and discussable paper. I have much pleasure in proposing a vote of thanks.

## WRITTEN CONTRIBUTIONS

**Mr G. V. Bayley:** I welcome Mr Smaller's clear reference in § 5.15 to the fundamental process of identifying *revenue* surplus starting from book values of assets and a net premium valuation, and in § 5.16, to ways of compensating that revenue for the shortfall in investment income because of investing in equities as distinct from gilts. One method he suggests is to transfer enough from investment reserve to support bonuses at the level appropriate to a wholly gilt portfolio. The method has instinctive appeal in its attempt to restore revenue to what policyholders could have enjoyed, and I have tried to use it. However, there are difficulties at the intellectual and practical levels. The gilt portfolio criterion would logically require one to identify and fix the long term rate appropriate to each premium paid and so, effectively, exclude the actual investment experience for the period of write up, however defined. And that itself is difficult because the actual dividend revenue being received is generally increasing, and continually affected by portfolio changes.

At the practical level, therefore, the appropriate investment income shortfall is troublesome to calculate for past premiums, invested at their different rates of interest at the time. Considerable investment record-keeping would be needed to do the job properly, and the calculations become highly intractable.

My over-riding uneasiness with the system, though, is that in the limit the resulting reversionary bonuses depart too far from reflecting *actual* investment experience. I therefore now prefer an approach which seeks to avoid such difficulties. It is to calculate the increases in equity dividend income over the past year; then capitalize its future flow, on the assumption that the aggregate increase is there to stay; and then transfer the result as the appropriate measure for crediting revenue from capital. The idea has substantial justification in the ratchet approach to dividend increases by many companies, by raising dividends to a level their Boards hope to *maintain* in future.

The main rules are:

(1) There must be a sufficient investment reserve out of which the result can be transferred to revenue, as the author himself hints in § 5.16.
(2) Adjustments for investment changes in the year are needed to evaluate the right total of dividend increments to be capitalized. Also some smoothing is needed taking one year with another.
(3) A judgement is required on the rate of interest to be used in the calculations. The upper limit to the transfer would normally be defined by using the average dividend yield on the equities held on the valuation date taken at market value.

The method seeks to transfer more of the actual investment experience into revenue surplus for distribution as reversionary bonuses, rather than leaving too much of the fruits of experience to be swept up in the catch-all terminal bonus calculation using the asset share at exit.

Obviously there are practical limits on how far an office can go in calculating the transfers as the author explains elsewhere, because of the ultimate trade-off between reversionary bonuses which are guaranteed, and terminal bonuses which are not. In the end, those are the considerations that influence the rate of interest for capitalizing the dividend increments, and deciding how much that source of profit can be distributed as reversionary bonuses.

I prefer some such approach because it addresses actual investment experience, and forces one to consider the wider issue of apportioning the results between reversionary and terminal bonuses, to which the author gives welcome attention in his paper. However, I join issue with him, and support Mr Froggatt, in challenging the validity of a constant EBR of a conventional contract regardless of duration or term to maturity; it does not match the *declining* proportion of the total reserve which is free of the need to secure the guaranteed benefits as the contract progresses to maturity. A declining EBR, moreover, requires an altogether different system of measurement and allocation from the one put forward in Appendix 5.

**The author** (who had replied briefly at the meeting) subsequently wrote: A number of speakers have commented on the nature and content of illustrations and have suggested alternatives to the present practice of illustrating on current rates. Illustrations on the assumption that investment returns will be at a particular level ignores many of the components of bonus and is an over-simplification. Projecting future benefits on alternative levels of bonus does have considerable merit, but can complicate the quotation. My own office adopted this practice for terminal bonuses many years ago but, unfortunately, the initiative was not taken up by the industry. Using a proportion of current bonuses can suggest that the level illustrated is one below which bonuses are not expected to fall and may well be read by the policyholder as implying a minimum guarantee.

There are no perfect solutions. Although the alternatives put forward have some shortcomings, they are nevertheless preferable to the maintenance of present practice. Initiatives by individual offices are unlikely to succeed; what is required is consensus within the industry for a common approach. The task undertaken by the Working Party looking into this matter is a challenging one; I await with interest its recommendations.

In his opening remarks, Mr Jones expressed the view that bonus philosophy should dictate investment strategy rather than, as I suggested, the reverse. With profit policies are sold in competition with other forms of saving, which are judged in terms of the return they produce to the investor. The assets of a life fund pertaining to such business have therefore to be invested to maximize the expected investment return and the manner in which surplus is distributed must therefore have regard to the way in which the assets are invested. The advent of terminal bonuses is the result of equity investment and not the reason for it.

Changes in premium rates was suggested as an alternative to opening a new bonus series. If, by changing premium rates, one means increasing them, then the purpose behind this must be the maintenance of bonuses at the levels currently declared. Such an approach would give rise to problems of equity, which terminal bonuses could only partly resolve. It would also exacerbate the problem of shareholders' profits to which Mr Iqbal referred and to which I shall return. Furthermore, increasing premium rates would only serve to confirm the view already widely held that bonuses will never reduce.

Mr Froggatt reminded us of the concept, described in a paper of which he was co-author, of the progressive switching from an unmatched equity fund to a matched fixed interest fund as the policy approaches maturity. The idea has considerable merit. If such a course were followed, one should reflect the profits or losses from switching in the rates of reversionary bonuses declared from time to time.

Mr Shaw's contribution on terminal bonuses and his reference to single premium policies raises questions of equity in using the same scales of terminal bonus for annual and for single premium policies. In the case of life assurance contracts, the problem is not significant but, for pensions policies where single premiums are quite normal, serious problems of equity can arise. The subject is a suitable one for further research.

I found Mr Hairs' comments very thought provoking. In encapsulating his thoughts in the form of an examination question he has, I believe, helped to focus our attention more sharply on the problems with which we shall be faced. The answers are beyond my three sigma limits—I look forward to reading the model solution!

Mr Kennedy disagreed with my definition of the Equity Backing Ratio. On reflection I am happy to adopt his suggestion of a Fixed Interest Backing Reserve Ratio, as it is more relevant to the principles discussed in the paper and results in a simpler formula.

Mr Iqbal suggested that one should look at the experience of a model office in determining bonus strategy. Such an exercise might well tell us how long we could afford to maintain current rates of bonus and what the effect on the estate would be, but it does not address the question of 'fair shares'. We need to look after the sheep as well as the flock.

I would like now to return to the question of shareholders' profits. I have a lot of sympathy with the views expressed by Mr Iqbal. It is one thing to give the providers of capital a reward for the risks undertaken but quite another to make their share a substantial charge on policyholders' premiums. Increasing premium rates will only worsen the position and put proprietary offices at a disadvantage as compared with mutuals. The calculation of the shareholders' share of surplus at the net premium valuation rate of interest results in their receiving rather more than the intended percentage. The solution is to calculate their share at a rate of discount appropriate to current financial conditions, allowing for tax where appropriate.

I entirely endorse Mr Jewell's plea for more meaningful communications to with profits policyholders. However, the manner in which we report on performance must tie in with the statements we make in our prospectus. To report on economic and financial conditions and their effect on bonuses has little relevance if we have made no reference to these matters in our sales literature.

The Appendix on Terminal Bonuses was intended to illustrate an approach to the calculation of such bonuses, which arise mainly from investment profits, and not as a treatise on the subject. In the interest of brevity the treatment of miscellaneous sources of profit and loss was omitted. These would clearly be brought into account in the rates of terminal bonus declared.

Finally, I would like to thank Mr Jones for opening a stimulating discussion, the speakers who contributed to it, and Mr Scurfield for drawing together the many strands of thought expressed by those who participated in the discussion.