PROPOSALS FOR THE STATUTORY BASIS OF VALUATION OF THE LIABILITIES OF LONG-TERM INSURANCE BUSINESS


[Submitted to the Institute, 27 January 1975]

Life Assurance is an institution possessing such an important influence in the welfare and well-being of Society that it is most essential the principles upon which it is based and conducted should be such as to ensure its lasting stability and prosperity.

H. W. Manly (1868)(1)

1. INTRODUCTION

1.1. Section 78 of the Insurance Companies Act 1974 makes provision for Regulations to be made for the valuation of assets and liabilities. Regulations relating to the valuation of assets, although not published at the time of writing, are expected to be laid before Parliament in the near future.

It is expected that the corresponding Regulations for the valuation of liabilities will be issued later in 1975.

1.2. The Department of Trade has consulted interested bodies, including the Faculty and the Institute, with regard to proposals for the content of the Valuation of Liabilities Regulations and with its permission part of the relevant Consultative Note is reproduced in Appendix I.

1.3. Discussions have so far taken place on the basis of the ‘six principles’ (see 3.3.5). However, the period of rapid and quite unprecedented change through which we are passing has led to the need to reappraise these principles.

1.4. As a consequence, the Councils of the Faculty and Institute established a Working Party with the following terms of reference. ‘To consider the desirability and possibility of modification of the method of valuation embraced in the “six principles” (J.I.A., 97, 161)(2) so that:

(a) for the general range of long-term life assurance contracts the value of the net liabilities can be compared with the market value of the assets, even during a period of rapid change, to ensure a reasonable standard of adequacy (see J.I.A., 92, 76, §§ a, b, c)(3) rather than a mere demonstration of solvency, and

(b) statutory rules for such a valuation can be designed’.

1.5. The membership of the Working Party comprised the authors and Mr G. E. Barrow, M.B.E., F.I.A., F.S.S. Unfortunately, due to indisposition Mr Barrow was prevented from participating in authorship of the paper.

1.6. The authors wish to make it clear that although this paper results from
Proposals for the Statutory Basis of Valuation

the deliberations of the Working Party, the views expressed are those of the authors.

2. Overseas Control Systems

2.1. Introduction

2.1.1. The United Kingdom is the only major life assurance market in the world where no statutory minimum basis for the valuation of liabilities exists. It has, therefore, for some time, been inevitable that a statutory basis would be imposed in this country.

2.1.2. Before bowing to the inevitable it is, however, appropriate to consider the systems that exist overseas. By analysing their strengths and weaknesses it is hoped that attention can be drawn to those elements of control that tend to stifle innovation and competition and on the other hand to those that ensure the fulfilment of the company’s obligations to its policyholders.

2.2. Australia

2.2.1. The first life assurance policies written in Australia were issued by British companies. Subsequently, a local industry developed, largely based on the mutual principle. The local offices quickly extended their operations overseas, reaching the U.K. in the later part of the nineteenth century. The local market has close traditional ties with the U.K. and, therefore, its control system is of some relevance.

2.2.2. Australian legislation provides for a net premium valuation of liabilities at 3½% interest with prescribed bases for mortality and zillmer adjustment. A statement showing how values of investments are arrived at must be appended to the balance sheet together with a certificate that assets are in the aggregate fully of the value stated. There is no statutory definition of value.

2.2.3. Since, in general, the conduct of the business is on U.K. lines, with a heavy emphasis on traditional with profits, the statutory basis has tended to hold back surplus and restrict expansion. The problem was discussed by Ward who proposed a system of terminal bonuses to mitigate the problem.

2.2.4. Until recently market value was thought to be the maximum that would enable the asset value certificate to be given but the depreciation resulting from current levels of interest rates, coupled with the conservative liability valuation basis, would have imposed intolerable restrictions on the emergence of surplus. It now appears that redeemable securities may be taken at a value in excess of market value but not exceeding par.

2.2.5. Apart from fiscal measures designed to promote investment in Government Securities and close personal supervision by the Insurance Commissioner there are no specific controls on investments or premium rates.

2.3. Canada and the U.S.A.

2.3.1. The Canadian scene is also of considerable interest as there are a
number of substantial companies operating in the U.K. whose world-wide operations are subject to the control of Canadian legislation.\(^{(6)}\) There is a statutory basis for computing the minimum reserve which specifies a maximum rate of interest of 3½% for assurances and 4% for annuities. A number of standard mortality tables are specified distinguishing between ordinary, industrial and life annuity business. The Superintendent of Insurance has power to approve other mortality tables and higher rates of interest; the actuary requesting such treatment must justify his request. The net premium method is employed, sometimes modified to allow for initial expenses.

2.3.2. The terms and conditions of life assurance contracts are regulated by the laws of the individual Provinces of Canada. In general, the practice is to guarantee surrender values. This is different from the U.S. situation where guaranteed surrender values are required by law. This feature has had considerable impact on North American systems for the control and valuation of assets and is well described by Noback\(^{(7)}\) whose description of the historical origins of many of the existing control practices is of considerable interest.

2.3.3. In general, throughout North America there is a very severe restriction on the proportion of life assurance funds that may be invested in equities. On the other hand, it is recognized that a stringent market value approach ignores the fact that life assurance companies are going concerns. Following the collapse of the New York security markets in 1907 the authorities moved away from the market value concept and today amortized values are used for some categories of fixed interest securities, there being differences in detail between Canada and the United States. In both countries provisions exist for the stabilization of asset values by means of specific reserves.

2.3.4. One of the interesting features of Noback's book\(^{(7)}\) is the story of the origin of the use of the net premium system as a method of control in North America.

"In 1858, the first Massachusetts State Commissioner of Insurance Elizur Wright, challenged the financial statements of companies that determined their policy reserve liabilities by using a gross premium method of valuation. He contended that the gross premium method was not a sound test of solvency and persuaded the legislature to adopt the net level premium method as the legal standard. . . .

Wright wanted a uniform and stringent method of valuation. His strong stand led to a protracted dispute with the managers of the International Life Assurance Society of London, England. When this Society failed, the gross premium method of valuation was thoroughly discredited and Wright's position strengthened. His standard of valuation and calculation method were widely adopted."

2.4. Europe

2.4.1. One of the most rigid control systems applies in Germany where a 3% net premium valuation is prescribed. However, an explicit zillmer of 3½% is permitted and in addition negative values can be regarded as assets but they are not
admissible for the purpose of determining solvency. In general, assets are taken at the lower of cost and market value and premium bases are prescribed with virtually no scope for variation. There are published lists of approved investments for the technical reserves and a Trustee has to be appointed, any portfolio activity requiring his prior written consent. The Control Authority specifies maximum holdings of equities and properties, these being 15% and 25% of the total portfolio respectively. The overall effect of these controls is to leave very little scope for creativity and innovation.

2.4.2 In some respects a fairly similar situation prevails in Holland but unlike the German authorities the Dutch tend to exercise the discretions contained in their legislation. A net premium valuation is almost universally used, the basis being subject to scrutiny by the authorities. In general, equities and properties are taken, net of investment reserves, at the lower of cost and market value. Loans and fixed interest securities are normally valued at par. Although premium rates are not controlled there is, in effect, a correlation between premium and valuation bases largely induced by tax considerations. The majority of offices are members of a tariff group basing their premium rates on 4% interest. There are lists of approved investments although gilts and near gilts are accepted automatically. Control is exercised through a unique system of first private and then published warnings.

2.4.3. The situation in Switzerland is interesting as, although in common with most other European countries a net premium basis is prescribed for valuation of liabilities, specific regulations also exist for valuation of assets. These provide for fixed interest securities to be valued at a rate of interest not less than ½% greater than that used in the valuation of liabilities.

2.5. Conclusions

2.5.1. In most countries where a statutory valuation basis exists, a mere test of solvency was discarded long ago as providing inadequate protection for policyholders. The net premium valuation method has, therefore, secured almost universal acceptance as a method of control.

2.5.2. The greatest weakness of many foreign control systems is their failure to link the valuation of assets to the valuation of liabilities. Asset values have now fallen to a similar extent to the 1929 crash but at twice the pace. There is no doubt that throughout the world many offices may have great difficulty in demonstrating an adequate solvency margin on the basis currently laid down by the authorities.

3. Developments in the U.K. over the past 30 years

3.1. The development of life office practice

3.1.1. A control system should not unnecessarily repress commercial initiative and so must take cognisance of the traditions and structure of the market it seeks to govern. Therefore, at this point it is helpful to consider the development
3.1.2. At the end of the Second World War, only a handful of British Offices had been established for less than 50 years and over one half had been established for more than 100 years. The Canadian and Australian offices were beginning to obtain a sizeable share of the market. The life departments of (mainly proprietary) composite offices were beginning to expand.

3.1.3. The liabilities of offices at that time broadly consisted of a significant proportion of predominantly with-profit endowment assurances, whole-life assurances and annuities. Group deferred annuity business was in its infancy. With-profit premium rates contained fairly large bonus-loadings, to support reversionary bonuses at the then current rates of about 1½%. To obtain the higher yield then prevailing, it was considered appropriate for offices to invest what has since come to be called the 'estate' in equities, although not much of a move had been made in this direction.

3.1.4. By 1945, within the working lifetime of the older actuaries, all four elements of the actuary's 'MITE', that is mortality, interest, taxation and expenses, had given cause for concern. The lean war years had been financed on high rates of tax and low rates of interest, the dangers of which had been officially recognized in 1940 by the limitation of the life office tax rate to 37½%. The war also involved the risk of heavy mortality costs, as in general, offices did not include a war risk exclusion clause in their policies. The actuaries and the Board of Trade, as supervisory authority, therefore had reason for some self-congratulation; the insurance companies had weathered the storm, and policyholders had been fairly treated, under the supervisory system of 'freedom with disclosure'.

3.1.5. In the years immediately following the war the Government policy of low interest borrowing continued, culminating in the issue of Treasury 2½% (1975) at par between October 1946 and January 1947. By the end of 1947 the price had fallen to 82, and apart from a brief period in 1948, has not touched 80 since. In these conditions it seemed clear that closer attention should be paid to the matching of assets to liabilities. Two papers were presented in 1952; by Haynes and Kirton to the Faculty and by Redington to the Institute. Although written independently the papers show a close similarity of approach; Haynes and Kirton described 'paid-up immunization' and Redington 'full immunization'. Virtually the whole of Redington's paper is apposite to this subject and in particular he stressed three ways in which the solvency of the fund could be jeopardized—failure to immunize, unrestricted war risk cover, and onerous policy options, particularly guaranteed surrender values.

3.1.6. During the 1950s the cult of the equity developed. This led to consideration of the problem of distribution of surplus arising from investment profits. In 1953 Bayley and Perks addressed themselves to the subject in their paper to the Institute on 'A consistent system of investment and bonus distribution for a life office'. The prices of ordinary shares advanced and the reverse yield gap first
appeared in August 1959. The first terminal bonus systems made their appearance and also the unit trust movement began to seek new avenues for marketing its products, one result being the introduction of linked life assurance.

3.1.7. The established life offices viewed this last development with misgiving, feeling that it might endanger tax relief on life insurance premiums. In the event the Inland Revenue decided that no distinction should be drawn between unit linked and traditional life assurance. In retrospect this decision can be seen to have had a critical effect on subsequent development of life assurance in this country. Many of the unit-trust companies formed their own life companies, and not to be outdone, the older offices produced their own unit-linked policies. A further development was the linking of benefits to property values as well as traditional equity-based unit trusts. More recently the managed-fund concept has emerged, turning the wheel full circle back towards the mixed portfolio of the traditional offices.

3.1.8. Another aspect of the 'marketing revolution' was the development of single-premium contracts which enable the investor to enjoy the roll-up of his investment on a favourable tax basis. These products, remote from the mainstream of traditional life assurance, were in direct competition with building societies and other traditional avenues for lump sum investments.

3.1.9. Although these developments have stimulated the life assurance industry into some much needed changes, they have had two very damaging consequences. The deliberate exploitation of artificial life assurance contracts to secure tax reliefs resulted in the imposition of the 'qualifying policy' rules in the Finance Act 1968. This justified the misgivings referred to in § 3.1.7 and has had the inhibiting consequences that the self-policing rules, operated until then by the traditional offices, had been designed to avoid.

3.1.10. The other consequence has been the recent insolvencies of some offices who, with inadequate resources, had chosen to disregard basic principles that enabled the traditional offices to weather earlier storms.

3.1.11. In the traditional life assurance field, the actuaries, stimulated by the demand for a share in unrealized investment gains and by the competition from unit-linked business, continued to develop the terminal bonus system in the early 1960s. Many different philosophies have emerged, ranging from the relatively stable terminal bonus, which treats the bonus as a means of distributing surplus locked up in the valuation basis, to the much more unstable bonuses, associated with giving full effect to market conditions and the resulting fluctuations in unrealized investment appreciation.

3.2. Legislative developments

3.2.1. In 1958 a new Insurance Companies Act was passed, largely as a consolidation measure, but this was followed in the mid-1960s by a crop of failures of cut-price motor insurers. The Companies Act 1967 was, therefore, used as a means of introducing considerable amendments to the law relating to Insurance Companies. Resulting from these changes new Regulations under the 1958 Act
governing statutory returns were made in 1968, but it was subsequently realized that these Regulations were not sufficient to provide early warning of such insolvencies when the Vehicle and General Group collapsed in March 1971, following losses on its motor account.

3.2.2. The report of the Tribunal of Enquiry(12) into the V & G collapse criticized certain senior civil servants for not intervening more quickly. At the time the prevailing view was that a Civil Servant would be at risk if he intervened without being able to show due grounds, because the intervention might in itself precipitate a collapse. The Tribunal report in February 1972 resulted in a shift in public sentiment towards further protection of policyholders, particularly the life policyholders in composite companies and in subsidiaries of conglomerates.

3.2.3. In February 1971 the Hilary Scott Committee was commissioned to study linked life assurance and its report(13) was presented in April 1973. Some of the suggestions of the report together with a number of recommendations from the Industry were included in the Insurance Companies Amendment Act which was passed in July of the same year and which gave the Secretary of State greatly enhanced powers.

3.2.4. The new Act included power to make Regulations covering a wide variety of subjects including valuation of assets and liabilities. A number of Regulations have already been issued and added impetus has been given by the recent failures referred to in § 3.1.10.

3.2.5. With insurance business being controlled by three separate Acts of Parliament, there was a clear need for consolidation. This has recently been achieved by passage of the Insurance Companies Act 1974.

3.3. The influence of Europe

3.3.1. Before leaving this historical survey, it is necessary to consider how the strengthening of links with Europe has influenced legislative developments.

3.3.2. Continental life assurance practice differs fundamentally from that of Britain. As discussed in § 2.4. the authorities frequently control the bases used for premiums, valuation and surrender values, although the rules vary widely from one country to the next.

3.3.3. With the establishment of the E.E.C. in 1957, it became apparent that the question of harmonization would require detailed study. Work was undertaken by the O.E.C.D. Insurance Committee, eventually leading to publication of the Buol Report.(14) At the same time European insurers carried out their own studies through the Life Working Group of the Comité Européen des Assurances (C.E.A.), which, of course, included representatives from non-E.E.C. countries.

3.3.4. Despite the break-down of Britain's first attempt to join the E.E.C. in the early 1960s, British actuaries were closely involved because they realized that if Britain did eventually enter the E.E.C., the older system of 'freedom with disclosure' would not be entirely acceptable to other members. The British were anxious to avoid the need to control premium bases and investments, as this
would not have been compatible with the with-profits system that formed such a vital element of the U.K. market.

3.3.5. In 1966 Skerman published his five principles for a solvency standard\(^3\) in *J.I.A.* These were adopted by the C.E.A. Working Group, with the addition of a sixth principle, namely that the reserves must cover any guaranteed withdrawal benefits. The six principles were then put forward as suitable for inclusion in a 'life directive'.

3.3.6. Later in the year a European viewpoint was put by Ammeter in two notes\(^{(15)-(16)}\) in *J.I.A.* Ammeter commented that Skerman's proposals to limit the valuation interest rate to the current yield on the fund (less a margin) would not be regarded on the Continent as providing adequate protection; the limit should rather be the rate of interest laid down by the authorities for premiums, which would have regard to cautious long-term considerations.

3.3.7. The proposed Valuation of Liabilities Regulations are based firmly on the 'six principles', and since they have secured widespread acceptance by European Insurers any major change in the proposals would have repercussions outside the U.K.

4. **VALUATION OF ASSETS**

4.1. In the Consultative Note relating to the proposed Valuation Regulations the Department of Trade stated 'It is essential for assets and liabilities to be valued on consistent bases and Rule 2 of the proposed Rules for valuing long-term business liabilities provides the link'. This is a fundamental principle with which it is hard to disagree. It follows that before considering the proposals for valuation of liabilities it is essential to consider the proposals for Valuation of Assets Regulations.

4.2. Although not published at the time of writing it is known that the Regulations will cover both general and long-term business. For long-term business market values will be used for quoted securities and real property. Subsidiary companies will be valued on a 'look-through' basis and the break-up concept will, in general, apply to other assets e.g. motor cars and office equipment are valued at 50% of cost in year of purchase and nil thereafter.

4.3. Consideration of the detail of the asset value Regulations is outside the scope of this paper, but it should be noted that the full value of an asset as determined may not in certain circumstances be admissible and some classes of asset will be wholly inadmissible.

5. **VALUATION OF LIABILITIES**

A particular valuation basis may be desirable for many reasons, but it must be a servant of realities for it cannot be their master.

F. M. Redington\(^{(10)}\)

5.1. The valuation method

5.1.1. The valuation method suggested in the Consultative Note is the net premium system. The choice of this method follows inevitably from the events already outlined.
5.1.2. The net premium method has been subjected to considerable criticism as a basis for statutory controls. The critics usually argue that the only valid method for testing solvency is a gross premium method. Whilst this may be true it must be remembered that the authorities are not seeking a mere demonstration of solvency but wish to establish a standard of good conduct, i.e. achievement of the reasonable standard of adequacy referred to in the Working Party's terms of reference. The desire of the authorities to insist on a standard of adequacy seems understandable and reasonable. After all, one of the main purposes of British insurance legislation is to prevent insolvencies. Thus, failure to reach the required standard of adequacy would not, in itself, mean that the company was insolvent but would act as a warning signal to enable remedial action to be taken. On the other hand, if the authorities employ a simple solvency test this will not prevent failures as in any case where the test is failed, by definition it is too late for remedial action to be taken.

5.1.3. Another objection to the net premium system is that the provisions for future bonuses and future expenses are implicit, that is not specifically defined. On the other hand, the net premium system has great attractions as a measure of good conduct in that it does not capitalize profits arising from future premium payments and thus could be said 'to take some account of policyholders' reasonable expectations'.(3) Indeed it can be argued that it is not the function of a control system to seek to make specific provision for future bonuses and that the mere act of preventing a company from taking credit for future bonus loadings is quite adequate. The alternative to this approach is to make provision for explicit solvency margins in a gross premium valuation. The dangers of such measures, particularly when applied as percentage increments to calculated reserves, are well illustrated by Ammeter.(15)

5.1.4. Another criticism of the net premium method arises from the effects of a change in the mortality basis. Adoption of a lighter mortality table for assurances does not necessarily result in a reduction in reserves as would occur in a gross premium valuation. The precise effects are dependent upon the shape of the mortality curve and the results are, therefore, to some extent unpredictable. This feature was discussed as long ago as 1868 by Manly(4) who provided many interesting examples. However, in current conditions, it is felt that this objection should not be accorded undue weight. Although the phenomenon exists its effects are relatively trivial when compared with the effects of the large changes in interest rates which have now come to be regarded as normal.

5.1.5. The greatest objection to the net premium system is that it is not possible to secure complete consistency between the valuation of assets and the valuation of liabilities using the conventional valuation formula. If the market rate of interest increases this is manifested by a fall in asset values. Use of a corresponding rate of interest in a net premium valuation does not necessarily give rise to a proportionate decrease in the calculated liability. The reason is that as the valuation rate is increased the net premium valued is decreased.

5.1.6. Current yields are at historically high levels, with correspondingly low
asset values. Fears have been expressed that for the reasons given in § 5.1.5. the net premium method is likely to prove unduly stringent in today's conditions. Various modifications have, therefore, been suggested and these are developed in the following section.

5.2. Modifications to the net premium valuation formula

5.2.1. The formula generally used in the net premium valuation of a non-profit endowment is:

\[ S \cdot V_x = S \cdot A_x + t; n - t - S \cdot P_x; n - d_x + t; n - t \]

where \( S \) is the sum assured
\( t \) is the duration at valuation date
\( x \) is the age at entry
\( n \) is the term of the policy at entry.

The formula assumes that the sum assured is paid at the end of the policy year in which death occurs, that premiums are payable yearly in advance and that the policy is valued immediately before the \((t+1)\)th premium falls due. This equation of value can be rewritten in the form:

\[ V_1 \cdot A_x + t; n - t + \left( \frac{i}{1+i} \cdot V_1 + S \cdot P_x; n \right) d_x + t; n - t = S \cdot A_x + t; n - t \]  (1)

where \( V_1 \) represents the policy value for a sum assured of \( S \). This expresses the fact that the future income required to provide the sum assured on death or maturity can be regarded as the annual premium plus the interest income from \( V_1 \) both accumulated at further interest, with \( V_1 \) itself being returned at the expiry of the policy.

5.2.2. This method of valuing the liability can be criticized on the grounds that being based on a single rate of interest it takes no account of the fact that the assets representing the liability are invested to earn interest at a rate currently ascertainable, while future income will fall to be invested at rates which are not known but which it is prudent to assume will average out at less than that currently being earned. Let the first of these, the current return on assets, be denoted by \( g \) and the best estimate of the second, the expected return on future investments, by \( i \). Strictly speaking \( i \) should vary with term to run but for simplicity an average rate will be assumed applicable to all terms.

5.2.3. One possible modification of (1) which would allow for the different rates of return would be as follows:

\[ V_2 \cdot A_x + t; n - t + \left( \frac{g}{1+i} \cdot V_2 + S \cdot P_x^t; n \right) d_x^t + t; n - t = S \cdot A_x^t + t; n - t \]

This assumes that all future income including the income from \( V_2 \), namely \( gV_2 \), is reinvested at \( i \). The equation of value reduces to:
of the Liabilities of Long-term Insurance Business

It is self-evident that if \( g > i \), then \( V_1^i > V_2 \).

5.2.4. Another possible modification takes the form:

\[
V_3 = \frac{g - i}{1 + i} \cdot A_{x+t:n-i}^i + \frac{g}{1 + g} \cdot V_3 + \frac{A_{x+t:n-i}^i}{P_x^i} \cdot S \cdot P_{x:|n|}^i \cdot \ddot{a}_{x+t:n-i}^i = S \cdot A_{x+t:n-i}^i
\]

Here the assumption is that the income from \( V_3 \) can be applied as the annual premium for a new policy for the balance of the term with an office which bases its premiums on \( g \), i.e. that the income from \( V_3 \) can be invested at \( g \). This equation reduces to:

\[
V_3 = V_1^i \cdot \frac{A_{x+t:n-i}^g}{A_{x+t:n-i}^i}
\]

which is the paid-up sum assured calculated at \( i \) and discounted at \( g \). It is clear from the development of the respective equations of value that when \( g > i \), \( V_2 \) is always greater than \( V_3 \).

5.2.5. A further suggested formula is derived from:

\[
V_4 = A_{x+t:n-i}^g + \left( \frac{g}{1 + g} \cdot V_4 + S \cdot P_{x:|n|}^i \right) \ddot{a}_{x+t:n-i}^g = S \cdot A_{x+t:n-i}^g
\]

which assumes that the premiums and the interest on \( V_4 \) can both be invested at \( g \). Therefore \( V_4 \) clearly gives the lowest values of all the formulae considered so far. The equation reduces to:

\[
V_4 = S \cdot A_{x+t:n-i}^g - S \cdot P_{x:|n|}^i \cdot \ddot{a}_{x+t:n-i}^g
\]

which is the normal net premium reserve, \( V_1 \), calculated at \( g \), but using a net premium calculated at \( i \).

5.2.6. The successive adjustments to the equation of value show that when \( g > i \):

\[
V_1^i > V_2 > V_3 > V_4
\]

As a general rule \( V_1^g > V_3 \), since a paid-up sum assured is usually greater if calculated at a higher rate of interest. Sometimes \( V_2 > V_1^g \) and sometimes the opposite applies. In order to investigate the behaviour of the four possible methods, various calculations have been made. The results are discussed in the next section.

5.3. An examination of some numerical results

5.3.1. The effect of changes in interest rates on the value of assets of various terms is shown in table (a) of Appendix 2. It is assumed that in each case the asset is a fixed interest stock with a coupon of 4·8% gross (3% net). The net rate
72 Proposals for the Statutory Basis of Valuation

of interest shown in the table represents the net redemption yield and not the gross redemption yield net of tax. (See § 5.4.8.)

5.3.2. Table (b) of Appendix 2 shows the effect of changes in the net interest rate on the unadjusted net premium reserves \( (V_{ij}) \) for various different typical policies. Non-profit contracts have been considered in order to simplify the illustrations. By setting out the two tables separately, no attempt has been made to hypothecate a particular term of investment to a policy of a particular outstanding term, or indeed a particular valuation rate to a particular current yield on assets \( (g) \).

5.3.3. The chief criticism of the net premium method (see § 5.1.5.) is that it is not sufficiently sensitive to changes in the rate of interest and hence is too strong at a time of rising interest rates in the context of what would normally be regarded as a reasonably matched asset situation. In particular, this objection is raised in circumstances when full immunization can be assumed and hence valuation is made at rate \( g \). It is also open to the converse criticism that it does not react sufficiently to a reduction in the rate of interest. An examination of tables (a) and (b) in Appendix 2 shows that, contrary to expectations, the net premium reserve \( (V_{ij}) \) is far from being too stringent at high interest rates and the longer outstanding terms. For example, consider the case of the policy value \( 5V_{30} \). If it is assumed that the liability is matched by a holding of an irredeemable stock, a change in the interest rate from 3\% to 4\% net gives rise to an asset value of 750 and a liability of 817, a net deficit of 67. However, as the interest rate rises the deficit reduces until it is totally eliminated when the interest rate reaches 8\% net. Subsequent increases in the interest rate give rise to a profit. The origin of the phenomenon is that, as interest rates rise, the mean term of the asset-income (using Redington's terminology)\(^{(10)}\) reduces faster than the mean term of the liability-outgo. At very high rates of interest it is only possible to immunize policies of relatively short outstanding terms.

5.3.4. The chief problem therefore appears to be with offices whose business is generally of a short term to run, where the net premium method becomes progressively more stringent as interest rates rise. Conversely, offices with longer-term portfolios may be lulled into a false sense of security by mis-matching profits when interest rates rise to a high level, and find themselves in difficulties if interest rates subsequently fall.

5.3.5. Before examining the proposed modifications to the net premium method, it is worth remarking on the effect of the requirement to have a margin of 10\% in the interest rate, with a minimum of 4\% net. Table (c) of Appendix 2 shows the percentage increase in the reserve, which the interest margin would produce. Generally speaking, the higher the interest rate and the longer the term to run, the greater will be the implicit margin in the reserves. The effect will tend to offset the mis-matching profits in § 5.3.4.

5.3.6. For a mixed portfolio of policies of short, medium and long outstanding terms, the strains and releases introduced by use of the net premium method may well roughly cancel out. Nevertheless, it would be preferable to find a
of the Liabilities of Long-term Insurance Business

5.3.7. Examples of the first modification discussed (V₂, § 5.2.3.), are set out in Appendix 3 in tables based on different assumptions for the long-term interest rate i. The thinking behind this modification differs from that adopted hitherto, since the assumption is that the valuation should be made at the long-term interest rate, but allowance made for the higher yield on existing reserves. In other words, the method veers towards the assumption of paid-up policy matching rather than full immunization.

5.3.8. It is interesting to compare the results shown in Appendix 3 with V₃. A line has been drawn in each of the three tables, to the left of which, V₂ < V₃ and to the right of which, V₂ > V₃. It can be seen that for low values of i, V₂ exhibits a greater degree of sensitivity to changes in g in those areas where V₃ is particularly insensitive. On the other hand, V₂ provides stronger reserves in those areas where V₃ is weak. The reason for this is that in the first case the use of a net premium calculated at rate i is the dominant effect, whereas for the longer terms to run, the restriction of the reinvestment assumption is more important. As i increases the use of a net premium calculated at rate i becomes less significant and for g > i = 10%, V₂ is always > V₃.

5.3.9. The findings discussed in the foregoing paragraph lead to the paradoxical conclusion that a strengthening of the reinvestment assumption can result in a lower reserve. This is due to the corresponding increase in the net premium valued and thus, it is clear that if this method is adopted it is particularly important that a limit should be placed upon the premium valued, i.e. the net premium should not exceed the office premium less a loading for future expenses.

5.3.10. The next modification to consider is the formula V₃ which, as mentioned previously, in effect represents the paid-up sum assured calculated at rate i, multiplied by a discount factor at rate g. One obvious effect is that low rates of i will generally give lower paid-up sums assured and hence lower reserves. Table (a) of Appendix 4 gives values of V₃ for i = 3%. It will be seen immediately that in all cases the reserves appear far too weak.

5.3.11. Although not tabulated in Appendix 4, values of V₃ have been calculated for i = 6% and 10% and in both cases the low values obtained indicate that the reserves are highly sensitive to the difference between i and g. It is quite clear that for the formula to give satisfactory results the relationship between i and g must be tightly constrained. Experiments have been carried out in an attempt to evolve a satisfactory relationship and the results are given in tables (b) and (c) of Appendix 4. In the first case i was defined as (g –·0025) and in the second case as ·9g.

5.3.12. It will be seen from Tables (b) and (c) that both definitions of i have the effect of producing values of V₃ slightly lower than V₃ at low rates of interest but as g increases the difference narrows so that V₃ approximately = V₃ at high rates of interest. The relationship i = ·9g gives results that are more in accord
with the movement of asset values but use of the formula in practice is easier to justify on the grounds of expediency than theoretical considerations.

5.3.13. The final formula developed in § 5.2. (V4, § 5.2.5.) involves an adjustment to the net premium valued. For a given value of i, changes in g exhibit similar characteristics to a gross premium valuation since the premium valued does not vary with the rate of interest. Since the immunization theory depends upon a gross premium valuation method it might be thought that this modification is most likely to achieve proportionate changes in liabilities and suitably matching assets. Table (a) of Appendix 5 gives values of V₄ assuming i = 3%. The weakness of the method is clearly exposed by the enormous negative values. The feature arises because this valuation method, like the gross premium valuation method, is highly sensitive to the difference between the interest rate underlying the premiums valued and the valuation rate.

5.3.14. If this modification is to be used in practice the relationship between i and g must be tightly controlled in the same way as for V₃. Tables (b) and (c) of Appendix 5 show the effects of defining i as (g – .0025) and as .9g respectively. The tabulated figures show that in both cases there is an undesirable weakening of reserves at the long terms to run, the first definition of i giving slightly improved results. It is doubtful whether the modification V₄ should be allowed, even with such a constraint; it is certainly not suitable for general application.

5.3.15. One interesting feature of the calculations shown in Table (a) of Appendix 5 is that in cases where a negative reserve emerges further increases in g may reduce the negative reserve. This result arises because as the interest rate increases towards infinity, the reserves must tend to return to zero from their previously negative values.

5.3.16. A study of the figures tabulated in the Appendices is necessarily subjective and their interpretation is inevitably difficult. The figures would, however, appear to suggest that:

1. The net premium method is not as stringent at very high rates of interest as is popularly supposed.
2. None of the suggested modifications to the net premium method would appear to merit general application.
3. The gross premium method of valuation is most unsuitable.

5.4. Valuation rate of interest—general considerations

5.4.1. As pointed out in § 5.2.2., the use of a single valuation rate of interest carries implications both for the assumed return on investments currently held and for the reinvestment rate which will be achieved in respect of future positive cash flow. In selecting a valuation rate, therefore, the return currently being obtained and resulting from past investment policy, together with expectations regarding the future investment returns to be available (in different investment areas and from future investment policy), must be borne in mind. Furthermore, the extent to which the fund can be considered immunized is an important factor and this will be discussed in § 5.4.5. et seq.
5.4.2. A conservative view would be to fix the maximum interest rate allowed by reference to the income return from admissible assets taken at their market value subject to an increase in order to take account of the writing-up of fixed-interest securities to their redemption value. A margin should be taken to guard against the possibility of the rate not being maintained during the reinvestment period.

5.4.3. The arguments for this approach are:

1. It takes a realistic view of the state of the fund as at the valuation date.
2. It takes no credit for future growth in dividends or rents, which may not materialize.

5.4.4. There are two grounds on which it might be held that substantially higher rates can be justified. Firstly, it may be argued that investment in equities and property is made only because they are expected in the long run to perform better than gilts and it is unrealistic to insist on only the current income return in conjunction with the market value of the asset. To this it can be replied that it is wrong to anticipate such higher returns in view of the uncertainty of receiving them and that a more desirable approach is to allow them to emerge as future surplus to accord with the investment policy chosen. In particular, in current conditions, the reverse yield gap may be not so much a measure of investors' expectations of future growth in income as an insurance premium against the risk of hyper-inflation.

5.4.5. Secondly, it may be argued that if careful attention has been paid to immunization of guaranteed liabilities (including declared bonus) so that the assets consist of (1) gilt-edged investments performing the immunization function, and (2) other assets (which may also include some gilts) providing hoped-for future profits for with-profit policyholders (and shareholders, if appropriate), then it is justifiable to value the immunized assets and liabilities at the current gilt-edged rate and treat the market value of other assets as free reserves.

5.4.6. The second argument is attractive but open to serious objections. To begin with there are a number of unrealistic assumptions underlying immunization theory—notably that the yield curve is a horizontal straight line which moves only vertically upwards or downwards, and that assets of any desired term may be purchased in any quantity required. The departure of the real situation from this ideal world would make reliance on immunization dangerous. We have recently seen the yield curve with values of 10% and 17% on the two extremes, which emphasizes the unreality of the assumption.

5.4.7. Immunization is against small interest rate fluctuations only, and we appear now to be living in circumstances where rates fluctuate rapidly and sharply. Maintenance of the immunized condition would involve an extremely active investment policy. This would undoubtedly lead to very real losses as trading would be without regard to market conditions.

5.4.8. The theory ignores the effects of taxation. Due to the tax-free nature of the redemption profit of a gilt-edged security the effective tax rate is not constant
but varies as a function of the gross redemption yield (except for irredeemable investments and cash). For the immunization theory to apply for taxable business, the net rate of interest used for the valuation of liabilities must be based upon net redemption yields.

5.4.9. At sufficiently high rates of interest it is not possible to immunize annual premium business (as is discussed in § 5.3.3.).

5.4.10. Due to the obvious difficulty of maintaining a truly immunized position it could be argued that detailed evidence as to the matching of assets and liabilities should be published so that the actuary can substantiate any assertions he makes regarding immunization.

5.4.11. The dangers are perhaps best summed up in Redington's own words 'There should be added a clear warning that the whole examination is theoretical. Not only are there many and serious difficulties in giving practical effect to the theory (amounting in many circumstances to impossibility), but the extent to which it would be wise in practice to adopt the theory is a matter for consideration.'[(10)]

5.4.12. In conclusion it is felt that unless a margin is taken as referred to in § 5.4.2. only in the most exceptional circumstances would it be justifiable in the conservative view for the valuation rate of interest to correspond to the full income return on assets.

5.5. Valuation rate of interest—the Department’s proposals

5.5.1. At this point it is appropriate to consider the Department of Trade's proposals with regard to the valuation rate of interest. These are given in Rule 2 of Appendix 1.

5.5.2. It should be noted that the proposals permit the use of a higher rate of interest than the maximum considered desirable in the conservative view referred to in § 5.4.2. This arises from the permitted calculation of the maximum rate of interest by reference to actual interest earnings on assets valued at a figure less than market value. This proposal is unsound and its use can disguise an insolvent position as is demonstrated in the following paragraph.

5.5.3. Consider two offices A and B, the business of each consisting of identical single-premium capital redemption policies for 1,000 maturing twenty years from the valuation date. Suppose that the assets of the two offices are identical and that they have a value of 420 determined in accordance with the proposed rules. Office A has been very conservative in its asset valuation and shows a fund of 235 from which the yield is 8.5%. Ignoring tax and expenses, the proposed rules would permit the liabilities to be valued at 7.65% giving a figure of 229. Thus a surplus of 6 would be disclosed and an apparent margin retained of no less than 185 between the statutory maximum value of the assets and the balance sheet value. On the other hand, office B has valued its assets at nearly the maximum allowed showing a fund of 400. According to the proposed rules the yield is 5% and the office will be required to value its liabilities at a rate not exceeding 4.2% giving a minimum figure of 439. Thus A appears abundantly
solvent and B insolvent although the real financial positions of the two offices are identical.

5.5.4. The suggestion that the maximum rate of interest should be calculated by reference to actual interest earnings is also open to criticism. Admittedly, the actuary is given certain powers to adjust the calculated rate of yield if it does not give a proper indication of the rate of investment income to be expected in the future. However, in the case of most funds it could be argued that the calculation would not give an appropriate result and thus the proviso virtually nullifies the rule.

5.5.5. In general, actual interest earnings are not appropriate as they are not necessarily related in any way to the investments held at the valuation date. Furthermore, the flow of investment income can be severely distorted by outside influences such as the postponement of dividend payments by companies that occurred upon the introduction of Advance Corporation Tax.

5.5.6. It is felt that a more realistic indication of future investment income could be obtained by reference to an 'in force' figure. The overall rate of yield on the fund would be determined by reference to the yields (to redemption in the case of redeemable securities) of the individual admissible investments, weighted by their market values. The calculations should be on the basis of the expected income for the subsequent year where it is secured by a contractual obligation or in other cases the income receivable by the present or previous owners of that investment during the preceding year.

5.5.7. Having considered the determination of the overall yield of the fund, it is now appropriate to consider the rates of interest to be used for valuation of individual contracts. The proposed rules merely provide that the weighted average of the rates of interest should not exceed a specified maximum. Unfortunately, this is unsound because the weight, being based on the liability at the interest rate used, is not a first degree function of the rate of interest. The following example demonstrates the dangers.

5.5.8. Office B, referred to in § 5.5.3., worried by its apparent insolvency decides to amend its valuation basis. Half its portfolio consists of old series capital redemption policies for 500 and the other half, new series policies. It proposes to value the old series at 2% giving a reserve of 336 and the new series at 11% giving a reserve of 62. The weighted average rate of interest used is only 3.4%. Thus, although using an apparently 'conservative' interest basis, it manages to demonstrate a 'surplus' of 2.

5.5.9. Another danger of the principle of the weighted average is that it can be used as a device to circumvent the 6th Principle. Any business subject to guaranteed surrender values could be valued at a sufficiently low rate of interest to ensure that the individual reserves always cover the guarantee. This then enables the remainder of the business to be valued at an artificially high rate of interest.

5.5.10. It is clear that a limit should be placed on the rate of interest used for valuing any individual policy. This could easily be achieved by providing that
use of a rate of interest in excess of the overall rate of yield on the fund is only permissible where it is possible to hypothecate assets amongst the various classes of business so that, for each valuation rate of interest used, the yield on the assets hypothecated to that business is not less than the valuation rate plus the specified solvency margin.

5.5.11. The final element in the calculation of the gross valuation rate of interest is the solvency margin of 10% of the yield (or 0.8% p.a. gross if greater). This is directly based on the recommendations of the C.E.A. to the E.E.C. Commission. The effects of this margin are shown in Table (c) of Appendix 2. The general pattern of results appears satisfactory. However, the principle of defining a margin of this nature is open to question as there is always a danger that instead of being taken as a minimum it becomes the norm.

5.5.12. So far only the gross rate of interest has been considered. The proposed rules envisage deduction of the appropriate rate of tax for business taxed on an (I–E) basis. The term 'appropriate' is not defined but it is to be hoped that an effective rate of tax may be used that recognizes the actual incidence of tax on investment income. The relationship between gross and net yields for redeemable securities has been referred to in § 5.4.8. Most offices take cognizance of this feature in their investment policy and in many circumstances will sacrifice gross yield in order to secure a higher effective net yield.

5.5.13. Another important tax consideration is the existence of unrelieved management expenses. Quite properly, the proposed asset valuation Regulations will not allow such future tax credits to be taken into account as an asset. On the other hand, it would be reasonable to take credit for unrelieved E by discounting at a gross rate of interest in the valuation formula for the period it is anticipated that it would take for the unrelieved E to run off.

5.5.14. In conclusion it is felt that the amount of allowance to be made for tax in arriving at the valuation rate of interest must be at the discretion of the Actuary. On the other hand, it would be appropriate to require the Actuary to justify the use of an effective rate of tax less than the full rate to which the life fund is subject, in circumstances where grossing up by the full rate would result in an interest rate in excess of the permitted maximum.

5.6. Rates of mortality and disability

5.6.1. The intention behind the proposed Rule 3 in Appendix 1 is not clear. The suitability of a particular mortality table for a particular portfolio of business would seem to be a matter that the actuary who is familiar with the experience of that portfolio is best fitted to decide. It is to be hoped that the Secretary of State will prescribe certain tables as standard and if the actuary wishes to make use of another table a justification of his choice must be included in the Statutory Returns. Any suggestion of prior approval being needed for the use of a non-standard table would seem to lead to unnecessary additional work for an already overburdened department.
5.7. Acquisition expenses

5.7.1. The proposed maximum zillmer adjustment of 3% of the sum assured seems quite adequate in normal conditions if no deduction has to be made for tax. It has been argued that a corresponding premium-related measure is required to cope with premium-related commission systems. This would appear unnecessary as the existing formula allows more than adequate scope for a premium related adjustment in most circumstances.

5.8. Future expenses

5.8.1. Proposed Rule 6 places the actuary in a difficult position. Even if hyper-inflation is not expected it is nonetheless 'foreseeable'. Furthermore, since the term 'rate of expenses' is not defined and, indeed, is hardly capable of definition it is felt that the margin referred to in Rule 6 should be 'sufficient in the opinion of the actuary to take account of increases in the rate of expenses in the future'.

5.9. Guaranteed discontinuance values

5.9.1. Rule 7, of course, attempts to give effect to the 6th Principle. At present this is a sensitive issue as the truth of Redington's warning referred to in § 3.1.5. has recently been fully demonstrated. The proposed rule does not, however, insist that the value of each contract will not be less than the amount of any surrender value, as it allows the actuary to make provision 'in such other way as is in his opinion appropriate'. It has been suggested that in certain circumstances it would be reasonable to make provision of an amount less than the surrender value.

5.10 Special types of contract

5.10.1. There are several types of contract for which the proposed Valuation Rules will not be suitable. The main category is unit-linked business which normally includes neither a bonus loading nor an interest guarantee. Clearly a net premium valuation method is not, in general, suitable for this type of business, but this is provided for in Rule 8.

5.10.2. Another class of business not referred to in the proposed Rules is temporary assurances. A simple net premium valuation of such business does not provide an adequate solvency standard. The considerations are similar to those for some types of general business except that the amount of the claim is defined and, therefore, the claims experience is not affected by inflation. It is felt that for temporary assurances some form of explicit solvency margin is required.

5.10.3. In general, the authors have concentrated their attention on annual premium whole life and endowment assurances. Time has not permitted a full study of other classes and in particular any special problems relating to Group Pensions, Industrial Life Assurance and Permanent Health Assurance have not been considered.
6. CONCLUSION

The opinion has been expressed, that the net premium method is one which must inevitably disappear before the advance of true actuarial science. Circumstances, however, seem to favour its continuance.

J. Sorley (1878)(17)

6.1. The original objective of the Working Party was to seek a modification to the valuation formula that would enable the value of the net liabilities to change with the rate of interest in proportion to corresponding changes in the value of the assets required to immunize the business. The Working Party have failed in this task for the good reason that it is impossible. No one asset or group of assets can immunize a portfolio against large changes in the rate of interest. Unless, therefore, the portfolio of investments is constantly switched, large changes in the rate of interest are bound to result in profits or losses regardless of the liability valuation method adopted.

6.2. The search for a liability valuation basis that on the change in rate of interest leads to proportionate changes in asset and liability values is only capable of satisfaction where the incidence of asset income is exactly equal and opposite to the incidence of liability outgo. This is, of course, the concept of 'matching valuation' that was discussed by Benjamin.(18) However, those that would advocate the use of such a technique as a solvency standard should consider the quotation at the head of § 5. Since in practice, this technique has so far only secured limited acceptance it is not realistic to contemplate such a radical departure from normal actuarial practice as a 'matching valuation'.

6.3. The figures in Appendix 2 demonstrate that where an office will have difficulty in coping with a large change in interest rates if the statutory basis is used, to a considerable extent this is a function of the very real strains to which it will have been exposed. A basis which provides an 'acceptable' result can often represent an unacceptable weakening of the valuation assumptions.

6.4. Nevertheless, it is hoped that where an office fails to meet the required standard the authorities will take a sympathetic view of the situation. The most severe financial strain to which a company is subject in inflationary conditions is the runaway escalation of expenses. In order to run its business at an economical level, in broad terms a company needs to expand its business at the rate of inflation. If an unnecessary standard of adequacy were imposed, resulting in a limitation of expansion, this could in the long term pose a much more serious threat to the company's solvency than the original failure to meet the valuation standard.

6.5. The relative freedom of the U.K. market has led to the development of a number of different approaches to the problems of serving the widely differing needs of the public. No one set of Valuation Rules can satisfactorily cover every special case and the Department's proposals must, therefore, be seen as a compromise. Indeed it could be argued there is a danger that in trying to satisfy all, there may be a failure to satisfy any. Undoubtedly, there will be soundly run
companies whose existing practices will not fit easily into the format of the proposed regulations. As an example, there are a number of offices who for many years have published gross premium valuations in the interests of providing more readily understandable results for their policyholders and the general public. On the other hand, it should be remembered that the proposed Valuation Rules are not intended to provide a basis for the publication of results nor for the distribution of surplus.

6.6. In conclusion it is hoped that the Department will continue to accord special treatment to offices whose particular circumstances will lead to difficulty in complying with the proposed rules. Ample time should be afforded for completion of the necessary changes in systems and procedures. An unreasonable regard for the letter of the law can only lead to a degree of trouble and expense that will adversely affect the ultimate return to policyholders.

7. ACKNOWLEDGMENTS

The authors wish to record their sincere appreciation of the advice and help given by Mr G. E. Barrow. Although prevented from participating in authorship of the paper he made a very valuable contribution to the studies of the Working Party.

The authors have received considerable advice and encouragement from fellow actuaries, many of whom have rendered practical assistance by checking drafts for errors of fact. In particular, they wish to thank Messrs C. O. Beard and C. H. R. Wood who supplied written material that has been made use of in the paper.

Finally, the authors wish to record their gratitude to Mrs M. Martin for cheerfully typing innumerable versions of the paper.

REFERENCES


(6) Canadian and British Insurance Companies Act 1932.


Proposals for the Statutory Basis of Valuation


(12) Report of the Tribunal Appointed to Inquire into Certain Issues in Relation to the Circumstances leading up to the Cessation of Trading by the Vehicle and General Insurance Company Limited. (H.C.133) Published, London: Her Majesty's Stationery Office.


The following Papers and Publications although not referred to in the text are considered by the authors to be relevant to the subject matter of the paper. This list is not intended to be exhaustive.


APPENDIX I

PROPOSED RULES FOR VALUING LONG-TERM BUSINESS LIABILITIES

The following rules were included in Annex B to the Department of Trade's Consultative Note 10 relating to the Insurance Companies Amendment Act 1973 and are published with the Department's permission. The rules were put forward as a basis for consultation and not as a draft of Regulations.

Rules
(1) The value of a long-term business contract shall be not less than the difference between the present value of the sums payable by the company under the contract according to the contingencies upon which they are payable, including any bonus or addition thereto made before the valuation date, and the present value of the future premiums, if any, calculated in accordance with these rules.

(2) The weighted average of the annual rates of interest used in calculating such present values for all contracts in force on the valuation date shall be lower than the overall rate of yield on the fund by an amount at least one-tenth of that rate of yield and not in any case less than 0·8%, together with such further amount as in the opinion of the actuary is necessary to take account of any foreseeable decrease in the yield on the fund during the term of the contracts in force on the valuation date. For the purpose of this rule:

(a) the weighted average rate of interest shall be obtained by applying as weights to each rate of interest used (grossed up to allow for the appropriate rate of tax when the business is taxed on the basis of investment income less expenses) the total value of the contracts valued in accordance with those rules at that rate of interest, and

(b) The overall rate of yield on the fund shall be obtained by reference to the amounts of interest, dividends, rents and amortization of redeemable fixed-interest investments credited or debited to the appropriate long-term business revenue account during the year immediately preceding the valuation date and to the balance of the fund shown in that account at the beginning and end of that year. When the value of the assets, including net current assets, of the long-term business at the end of that year calculated in accordance with the rules prescribed is lower than the balance of the fund shown in the account, or where changes in the investments or in the balance in that account during the year were such that the investment income credited does not, in the opinion of the actuary give a proper indication of the rate of investment income to be expected in future, the overall rate of yield on the fund may be adjusted by him to correspond with those changes.

(3) The rates of mortality and disability to be used for any class of contract shall be rates according to tables recognized as appropriate for the purpose by the Secretary of State.

(4) The premiums to be valued shall, except as provided in subsections (5) and (6), be such premiums as according to the rate of interest and rates of mortality, etc., employed in valuing the contract are sufficient to provide for the sums payable by the company under the contract according to the contingencies upon which they are payable, exclusive of any addition thereto for profits, expenses and other charges.

(5) In order to take account of acquisition expenses, it shall be permissible to make an addition to the annual premium to be valued at an amount not greater than the annual equivalent, taken over the whole period of premium payments and calculated according to the rate of interest and rates of mortality, etc., employed in valuing the contract, of 3% of the sum assured under the contract.

(6) The difference between the premiums to be valued, including any addition made under subsection (5), and the premiums payable under the contract shall, together with the provision made for expenses under contracts where there are no future premiums, be adequate in
relation to the company's current rate of expenses other than acquisition expenses (reduced to allow for the appropriate rate of tax where the business is taxed on the basis of investment income less expenses) and shall contain a margin sufficient in the opinion of the actuary to cover any foreseeable increase in that rate of expenses in future.

(7) The actuary shall make such provision as will in his opinion ensure that the minimum standards prescribed in the above rules may be maintained in future notwithstanding that surrender or paid-up values may be guaranteed under any contract. The provision shall be made by ensuring that the value placed on each contract is not less than the amount of any surrender value or the present value of any paid-up benefits guaranteed under the contract or in such other way as is in his opinion appropriate. Any negative policy values shall be excluded.

(8) For special types of contract in respect of which any of the above rules is inappropriate, the rules may be modified in a manner appropriate to the special terms of such contracts, provided that the method of valuation adopted by the actuary makes provision which is in his opinion adequate for the sums payable by the company under the contracts, for meeting the company's expenses in connection with the contracts and leaves a margin for contingencies consistent with that provided by the above rules.
**APPENDIX 2**

### Table (a) Asset values at various net rates of interest

\( V = 30 \, a_{\bar{\nu}} + 1000 \cdot v^n \) at rate \( g \)

<table>
<thead>
<tr>
<th>Term (Yrs)</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>5</td>
<td>955</td>
<td>913</td>
<td>874</td>
<td>800</td>
<td>735</td>
<td>676</td>
<td>622</td>
<td>574</td>
<td>542</td>
<td>492</td>
</tr>
<tr>
<td>10</td>
<td>919</td>
<td>846</td>
<td>779</td>
<td>709</td>
<td>634</td>
<td>570</td>
<td>501</td>
<td>451</td>
<td>426</td>
<td>372</td>
</tr>
<tr>
<td>15</td>
<td>889</td>
<td>792</td>
<td>709</td>
<td>634</td>
<td>570</td>
<td>501</td>
<td>451</td>
<td>426</td>
<td>372</td>
<td>324</td>
</tr>
<tr>
<td>20</td>
<td>864</td>
<td>750</td>
<td>664</td>
<td>599</td>
<td>500</td>
<td>444</td>
<td>404</td>
<td>348</td>
<td>324</td>
<td>275</td>
</tr>
<tr>
<td>25</td>
<td>844</td>
<td>716</td>
<td>624</td>
<td>559</td>
<td>486</td>
<td>431</td>
<td>381</td>
<td>337</td>
<td>309</td>
<td>263</td>
</tr>
<tr>
<td>30</td>
<td>827</td>
<td>693</td>
<td>587</td>
<td>500</td>
<td>446</td>
<td>401</td>
<td>356</td>
<td>315</td>
<td>290</td>
<td>247</td>
</tr>
<tr>
<td>40</td>
<td>802</td>
<td>657</td>
<td>549</td>
<td>484</td>
<td>414</td>
<td>374</td>
<td>334</td>
<td>304</td>
<td>284</td>
<td>245</td>
</tr>
<tr>
<td>∞</td>
<td>750</td>
<td>600</td>
<td>450</td>
<td>375</td>
<td>300</td>
<td>250</td>
<td>214</td>
<td>188</td>
<td>150</td>
<td>125</td>
</tr>
</tbody>
</table>

### Table (b) Net premium reserves at various net rates of interest

\( V_1^p = 1000 \cdot V_{x:1\%}^p \cdot V_{x:1\%}^{3\%} \)

<table>
<thead>
<tr>
<th>Policy values</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V_{30:1%}</td>
<td>1000</td>
<td>948</td>
<td>897</td>
<td>848</td>
<td>757</td>
<td>673</td>
<td>597</td>
<td>528</td>
<td>467</td>
<td>363</td>
</tr>
<tr>
<td>5V_{30:5%}</td>
<td>1000</td>
<td>871</td>
<td>755</td>
<td>652</td>
<td>483</td>
<td>355</td>
<td>259</td>
<td>190</td>
<td>139</td>
<td>76</td>
</tr>
<tr>
<td>15V_{30:5%}</td>
<td>1000</td>
<td>917</td>
<td>838</td>
<td>763</td>
<td>629</td>
<td>514</td>
<td>419</td>
<td>340</td>
<td>276</td>
<td>184</td>
</tr>
<tr>
<td>25V_{30:5%}</td>
<td>1000</td>
<td>969</td>
<td>938</td>
<td>907</td>
<td>845</td>
<td>784</td>
<td>726</td>
<td>672</td>
<td>621</td>
<td>531</td>
</tr>
<tr>
<td>5V_{30}</td>
<td>1000</td>
<td>817</td>
<td>677</td>
<td>546</td>
<td>437</td>
<td>370</td>
<td>257</td>
<td>183</td>
<td>135</td>
<td>72</td>
</tr>
<tr>
<td>15V_{30}</td>
<td>1000</td>
<td>856</td>
<td>732</td>
<td>627</td>
<td>464</td>
<td>350</td>
<td>270</td>
<td>214</td>
<td>173</td>
<td>120</td>
</tr>
<tr>
<td>25V_{30}</td>
<td>1000</td>
<td>892</td>
<td>794</td>
<td>708</td>
<td>566</td>
<td>457</td>
<td>375</td>
<td>312</td>
<td>265</td>
<td>198</td>
</tr>
<tr>
<td>35V_{30}</td>
<td>1000</td>
<td>924</td>
<td>853</td>
<td>787</td>
<td>671</td>
<td>576</td>
<td>499</td>
<td>436</td>
<td>384</td>
<td>307</td>
</tr>
<tr>
<td>45V_{30}</td>
<td>1000</td>
<td>951</td>
<td>904</td>
<td>858</td>
<td>773</td>
<td>698</td>
<td>633</td>
<td>577</td>
<td>528</td>
<td>449</td>
</tr>
</tbody>
</table>

### Table (c) Percentage increases in \( V_1 \) allowing for interest margin of \( \cdot \frac{1}{2} \% \) or \( \cdot 1\% \), whichever is greater

<table>
<thead>
<tr>
<th>Policy values</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V_{30:1%}</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>5V_{30:5%}</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>9</td>
<td>13</td>
<td>17</td>
<td>21</td>
<td>24</td>
<td>28</td>
<td>34</td>
</tr>
<tr>
<td>15V_{30:5%}</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>11</td>
<td>13</td>
<td>16</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>25V_{30:5%}</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>5V_{30}</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>13</td>
<td>17</td>
<td>20</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>15V_{30}</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>18</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>25V_{30}</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>35V_{30}</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>45V_{30}</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>
Proposals for the Statutory Basis of Valuation

APPENDIX 3

\[ V_2 = \frac{1000}{[\frac{1000}{V_{x:n}^{35/6}}] \left[ \frac{1 + g \cdot i}{1 + i} \cdot \frac{\frac{1}{i^{x:n}}}{\frac{1}{i^{x:n}} - i} \right]} \]

A49/52 ult.

Table (a)

<table>
<thead>
<tr>
<th>Policy values</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V30:15</td>
<td>1000</td>
<td>922</td>
<td>855</td>
<td>797</td>
<td>702</td>
<td>628</td>
<td>567</td>
<td>518</td>
<td>476</td>
<td>410</td>
</tr>
<tr>
<td>5V30:30</td>
<td>1000</td>
<td>876</td>
<td>748</td>
<td>664</td>
<td>542</td>
<td>459</td>
<td>397</td>
<td>350</td>
<td>313</td>
<td>259</td>
</tr>
<tr>
<td>15V30:30</td>
<td>1000</td>
<td>897</td>
<td>813</td>
<td>743</td>
<td>635</td>
<td>554</td>
<td>491</td>
<td>441</td>
<td>401</td>
<td>338</td>
</tr>
<tr>
<td>25V30:30</td>
<td>1000</td>
<td>957</td>
<td>918</td>
<td>882</td>
<td>817</td>
<td>761</td>
<td>713</td>
<td>670</td>
<td>632</td>
<td>568</td>
</tr>
<tr>
<td>35V30</td>
<td>1000</td>
<td>819</td>
<td>694</td>
<td>602</td>
<td>475</td>
<td>393</td>
<td>335</td>
<td>292</td>
<td>258</td>
<td>210</td>
</tr>
<tr>
<td>45V30</td>
<td>1000</td>
<td>843</td>
<td>729</td>
<td>641</td>
<td>518</td>
<td>434</td>
<td>374</td>
<td>328</td>
<td>292</td>
<td>240</td>
</tr>
<tr>
<td>5V30</td>
<td>1000</td>
<td>872</td>
<td>773</td>
<td>695</td>
<td>577</td>
<td>494</td>
<td>431</td>
<td>383</td>
<td>344</td>
<td>287</td>
</tr>
<tr>
<td>15V30</td>
<td>1000</td>
<td>905</td>
<td>826</td>
<td>760</td>
<td>655</td>
<td>576</td>
<td>514</td>
<td>463</td>
<td>422</td>
<td>359</td>
</tr>
<tr>
<td>25V30</td>
<td>1000</td>
<td>936</td>
<td>830</td>
<td>830</td>
<td>746</td>
<td>677</td>
<td>620</td>
<td>572</td>
<td>530</td>
<td>463</td>
</tr>
</tbody>
</table>

Interest rate \( i = 3.0\% \)

Table (b)

<table>
<thead>
<tr>
<th>Policy values</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V30:15</td>
<td>1000</td>
<td>948</td>
<td>897</td>
<td>848</td>
<td>740</td>
<td>656</td>
<td>590</td>
<td>535</td>
<td>490</td>
<td>419</td>
</tr>
<tr>
<td>5V30:30</td>
<td>1000</td>
<td>871</td>
<td>755</td>
<td>652</td>
<td>522</td>
<td>435</td>
<td>373</td>
<td>327</td>
<td>290</td>
<td>238</td>
</tr>
<tr>
<td>15V30:30</td>
<td>1000</td>
<td>917</td>
<td>838</td>
<td>763</td>
<td>642</td>
<td>555</td>
<td>488</td>
<td>436</td>
<td>393</td>
<td>330</td>
</tr>
<tr>
<td>25V30:30</td>
<td>1000</td>
<td>969</td>
<td>938</td>
<td>907</td>
<td>838</td>
<td>779</td>
<td>727</td>
<td>682</td>
<td>642</td>
<td>575</td>
</tr>
<tr>
<td>5V30</td>
<td>1000</td>
<td>817</td>
<td>667</td>
<td>546</td>
<td>424</td>
<td>346</td>
<td>293</td>
<td>253</td>
<td>223</td>
<td>181</td>
</tr>
<tr>
<td>15V30</td>
<td>1000</td>
<td>856</td>
<td>732</td>
<td>627</td>
<td>498</td>
<td>413</td>
<td>352</td>
<td>308</td>
<td>273</td>
<td>223</td>
</tr>
<tr>
<td>25V30</td>
<td>1000</td>
<td>892</td>
<td>794</td>
<td>708</td>
<td>581</td>
<td>493</td>
<td>428</td>
<td>378</td>
<td>338</td>
<td>280</td>
</tr>
<tr>
<td>35V30</td>
<td>1000</td>
<td>924</td>
<td>853</td>
<td>787</td>
<td>673</td>
<td>588</td>
<td>522</td>
<td>470</td>
<td>427</td>
<td>361</td>
</tr>
<tr>
<td>45V30</td>
<td>1000</td>
<td>951</td>
<td>904</td>
<td>858</td>
<td>768</td>
<td>696</td>
<td>635</td>
<td>585</td>
<td>542</td>
<td>472</td>
</tr>
</tbody>
</table>

Interest rate \( i = \text{the lesser of } g \text{ and } 6\% \)

Table (c)

<table>
<thead>
<tr>
<th>Policy values</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V30:15</td>
<td>1000</td>
<td>948</td>
<td>897</td>
<td>848</td>
<td>740</td>
<td>656</td>
<td>590</td>
<td>535</td>
<td>490</td>
<td>419</td>
</tr>
<tr>
<td>5V30:30</td>
<td>1000</td>
<td>871</td>
<td>755</td>
<td>652</td>
<td>522</td>
<td>435</td>
<td>373</td>
<td>327</td>
<td>290</td>
<td>238</td>
</tr>
<tr>
<td>15V30:30</td>
<td>1000</td>
<td>917</td>
<td>838</td>
<td>763</td>
<td>642</td>
<td>555</td>
<td>488</td>
<td>436</td>
<td>393</td>
<td>330</td>
</tr>
<tr>
<td>25V30:30</td>
<td>1000</td>
<td>969</td>
<td>938</td>
<td>907</td>
<td>838</td>
<td>779</td>
<td>727</td>
<td>682</td>
<td>642</td>
<td>575</td>
</tr>
<tr>
<td>5V30</td>
<td>1000</td>
<td>817</td>
<td>667</td>
<td>546</td>
<td>424</td>
<td>346</td>
<td>293</td>
<td>253</td>
<td>223</td>
<td>181</td>
</tr>
<tr>
<td>15V30</td>
<td>1000</td>
<td>856</td>
<td>732</td>
<td>627</td>
<td>498</td>
<td>413</td>
<td>352</td>
<td>308</td>
<td>273</td>
<td>223</td>
</tr>
<tr>
<td>25V30</td>
<td>1000</td>
<td>892</td>
<td>794</td>
<td>708</td>
<td>581</td>
<td>493</td>
<td>428</td>
<td>378</td>
<td>338</td>
<td>280</td>
</tr>
<tr>
<td>35V30</td>
<td>1000</td>
<td>924</td>
<td>853</td>
<td>787</td>
<td>673</td>
<td>588</td>
<td>522</td>
<td>470</td>
<td>427</td>
<td>361</td>
</tr>
<tr>
<td>45V30</td>
<td>1000</td>
<td>951</td>
<td>904</td>
<td>858</td>
<td>768</td>
<td>696</td>
<td>635</td>
<td>585</td>
<td>542</td>
<td>472</td>
</tr>
</tbody>
</table>

Interest rate \( i = \text{the lesser of } g \text{ and } 10\% \)

Table (d)

<table>
<thead>
<tr>
<th>Policy values</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V30:15</td>
<td>1000</td>
<td>948</td>
<td>897</td>
<td>848</td>
<td>740</td>
<td>656</td>
<td>590</td>
<td>535</td>
<td>490</td>
<td>419</td>
</tr>
<tr>
<td>5V30:30</td>
<td>1000</td>
<td>871</td>
<td>755</td>
<td>652</td>
<td>522</td>
<td>435</td>
<td>373</td>
<td>327</td>
<td>290</td>
<td>238</td>
</tr>
<tr>
<td>15V30:30</td>
<td>1000</td>
<td>917</td>
<td>838</td>
<td>763</td>
<td>642</td>
<td>555</td>
<td>488</td>
<td>436</td>
<td>393</td>
<td>330</td>
</tr>
<tr>
<td>25V30:30</td>
<td>1000</td>
<td>969</td>
<td>938</td>
<td>907</td>
<td>838</td>
<td>779</td>
<td>727</td>
<td>682</td>
<td>642</td>
<td>575</td>
</tr>
<tr>
<td>5V30</td>
<td>1000</td>
<td>817</td>
<td>667</td>
<td>546</td>
<td>424</td>
<td>346</td>
<td>293</td>
<td>253</td>
<td>223</td>
<td>181</td>
</tr>
<tr>
<td>15V30</td>
<td>1000</td>
<td>856</td>
<td>732</td>
<td>627</td>
<td>498</td>
<td>413</td>
<td>352</td>
<td>308</td>
<td>273</td>
<td>223</td>
</tr>
<tr>
<td>25V30</td>
<td>1000</td>
<td>892</td>
<td>794</td>
<td>708</td>
<td>581</td>
<td>493</td>
<td>428</td>
<td>378</td>
<td>338</td>
<td>280</td>
</tr>
<tr>
<td>35V30</td>
<td>1000</td>
<td>924</td>
<td>853</td>
<td>787</td>
<td>673</td>
<td>588</td>
<td>522</td>
<td>470</td>
<td>427</td>
<td>361</td>
</tr>
<tr>
<td>45V30</td>
<td>1000</td>
<td>951</td>
<td>904</td>
<td>858</td>
<td>768</td>
<td>696</td>
<td>635</td>
<td>585</td>
<td>542</td>
<td>472</td>
</tr>
</tbody>
</table>
APPENDIX 4

Values of $V_3 = \frac{1000}{V_{x:n}^{3\%}} \left[ \frac{A_x^g}{A_x^l + t:n - l} \right]$ A49/52 ult.

<table>
<thead>
<tr>
<th>Policy values</th>
<th>Net rates of interest (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5V_{30:15}$</td>
<td>1000 909 826 752 625 522 437 367 309 222</td>
</tr>
<tr>
<td>$5V_{30:30}$</td>
<td>1000 796 637 511 334 222 151 105 75 41</td>
</tr>
<tr>
<td>$15V_{30:30}$</td>
<td>1000 872 761 666 513 398 312 246 196 127</td>
</tr>
<tr>
<td>$25V_{30:30}$</td>
<td>1000 954 911 869 794 726 666 611 562 477</td>
</tr>
<tr>
<td>$35V_{30}$</td>
<td>1000 722 531 398 237 151 103 74 56 36</td>
</tr>
<tr>
<td>$15V_{30}$</td>
<td>1000 783 622 501 339 240 178 137 109 75</td>
</tr>
<tr>
<td>$25V_{30}$</td>
<td>1000 842 715 613 463 360 289 237 199 147</td>
</tr>
<tr>
<td>$35V_{30}$</td>
<td>1000 892 800 722 596 501 428 370 325 258</td>
</tr>
<tr>
<td>$45V_{30}$</td>
<td>1000 932 872 817 723 646 582 528 482 408</td>
</tr>
</tbody>
</table>

**Table (b)**

Interest rate $i = g - 0.0025$

<table>
<thead>
<tr>
<th>Policy values</th>
<th>Net rates of interest (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5V_{30:15}$</td>
<td>1000 938 888 840 751 668 593 525 464 361</td>
</tr>
<tr>
<td>$5V_{30:30}$</td>
<td>1000 852 740 641 476 351 257 189 139 77</td>
</tr>
<tr>
<td>$15V_{30:30}$</td>
<td>1000 906 829 756 624 511 417 339 276 183</td>
</tr>
<tr>
<td>$25V_{30:30}$</td>
<td>1000 966 935 904 843 783 726 671 621 531</td>
</tr>
<tr>
<td>$5V_{30}$</td>
<td>1000 793 651 535 365 255 182 135 102 64</td>
</tr>
<tr>
<td>$15V_{30}$</td>
<td>1000 838 719 618 460 348 269 213 172 120</td>
</tr>
<tr>
<td>$25V_{30}$</td>
<td>1000 880 786 702 562 455 374 312 264 198</td>
</tr>
<tr>
<td>$35V_{30}$</td>
<td>1000 917 847 783 669 575 498 435 384 307</td>
</tr>
<tr>
<td>$45V_{30}$</td>
<td>1000 947 900 855 772 698 633 577 528 449</td>
</tr>
</tbody>
</table>

**Table (c)**

Interest rate $i = 90\%$ of $g$

<table>
<thead>
<tr>
<th>Policy values</th>
<th>Net rates of interest (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5V_{30:15}$</td>
<td>1000 932 879 829 736 652 577 510 450 349</td>
</tr>
<tr>
<td>$5V_{30:30}$</td>
<td>1000 841 726 625 461 339 249 183 136 77</td>
</tr>
<tr>
<td>$15V_{30:30}$</td>
<td>1000 899 819 745 613 502 409 334 272 182</td>
</tr>
<tr>
<td>$25V_{30:30}$</td>
<td>1000 963 932 901 839 779 722 669 619 530</td>
</tr>
<tr>
<td>$5V_{30}$</td>
<td>1000 779 634 519 353 247 179 133 102 65</td>
</tr>
<tr>
<td>$15V_{30}$</td>
<td>1000 828 707 605 449 341 264 210 171 120</td>
</tr>
<tr>
<td>$25V_{30}$</td>
<td>1000 872 777 693 554 450 370 309 263 197</td>
</tr>
<tr>
<td>$35V_{30}$</td>
<td>1000 912 841 777 664 571 495 433 382 306</td>
</tr>
<tr>
<td>$45V_{30}$</td>
<td>1000 944 897 852 768 695 631 575 527 449</td>
</tr>
</tbody>
</table>
Proposals for the Statutory Basis of Valuation

APPENDIX 5

Values of $V_4 = \frac{1000}{r V^{30}_{x+n}} \left[ A^g_{x+1:n-1} - P^i_{x:n} \cdot a^{g}_{x+1:n-1} \right]$ A49/52 ult.

Table (a)

<table>
<thead>
<tr>
<th>Policy values</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V30:15</td>
<td>1000</td>
<td>825</td>
<td>669</td>
<td>532</td>
<td>300</td>
<td>118</td>
<td>24</td>
<td>-137</td>
<td>-226</td>
<td>-349</td>
</tr>
<tr>
<td>5V30:30</td>
<td>1000</td>
<td>424</td>
<td>-4</td>
<td>-321</td>
<td>-720</td>
<td>-920</td>
<td>-1007</td>
<td>-1031</td>
<td>-1019</td>
<td>-952</td>
</tr>
<tr>
<td>15V30:30</td>
<td>1000</td>
<td>826</td>
<td>678</td>
<td>552</td>
<td>354</td>
<td>210</td>
<td>105</td>
<td>-24</td>
<td>-92</td>
<td>-92</td>
</tr>
<tr>
<td>25V30:30</td>
<td>1000</td>
<td>950</td>
<td>903</td>
<td>859</td>
<td>778</td>
<td>705</td>
<td>640</td>
<td>582</td>
<td>529</td>
<td>439</td>
</tr>
<tr>
<td>5V30</td>
<td>1000</td>
<td>70</td>
<td>-505</td>
<td>-856</td>
<td>-1181</td>
<td>-1260</td>
<td>-1241</td>
<td>-1185</td>
<td>-1118</td>
<td>-990</td>
</tr>
<tr>
<td>15V30</td>
<td>1000</td>
<td>667</td>
<td>429</td>
<td>258</td>
<td>45</td>
<td>-67</td>
<td>-127</td>
<td>-159</td>
<td>-173</td>
<td>-181</td>
</tr>
<tr>
<td>25V30</td>
<td>1000</td>
<td>800</td>
<td>657</td>
<td>537</td>
<td>365</td>
<td>176</td>
<td>124</td>
<td>87</td>
<td>41</td>
<td>-</td>
</tr>
<tr>
<td>35V30</td>
<td>1000</td>
<td>882</td>
<td>782</td>
<td>697</td>
<td>562</td>
<td>461</td>
<td>384</td>
<td>325</td>
<td>278</td>
<td>210</td>
</tr>
<tr>
<td>45V30</td>
<td>1000</td>
<td>929</td>
<td>866</td>
<td>809</td>
<td>712</td>
<td>632</td>
<td>566</td>
<td>510</td>
<td>463</td>
<td>388</td>
</tr>
</tbody>
</table>

Table (b)

<table>
<thead>
<tr>
<th>Policy values</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V30:15</td>
<td>1000</td>
<td>918</td>
<td>870</td>
<td>825</td>
<td>738</td>
<td>658</td>
<td>585</td>
<td>519</td>
<td>459</td>
<td>358</td>
</tr>
<tr>
<td>5V30:30</td>
<td>1000</td>
<td>765</td>
<td>672</td>
<td>587</td>
<td>443</td>
<td>330</td>
<td>244</td>
<td>180</td>
<td>133</td>
<td>74</td>
</tr>
<tr>
<td>15V30:30</td>
<td>1000</td>
<td>895</td>
<td>820</td>
<td>749</td>
<td>620</td>
<td>508</td>
<td>415</td>
<td>338</td>
<td>275</td>
<td>183</td>
</tr>
<tr>
<td>25V30:30</td>
<td>1000</td>
<td>965</td>
<td>935</td>
<td>904</td>
<td>843</td>
<td>783</td>
<td>725</td>
<td>671</td>
<td>621</td>
<td>531</td>
</tr>
<tr>
<td>5V30</td>
<td>1000</td>
<td>646</td>
<td>548</td>
<td>463</td>
<td>329</td>
<td>235</td>
<td>172</td>
<td>128</td>
<td>98</td>
<td>62</td>
</tr>
<tr>
<td>15V30</td>
<td>1000</td>
<td>812</td>
<td>701</td>
<td>605</td>
<td>453</td>
<td>344</td>
<td>267</td>
<td>212</td>
<td>172</td>
<td>120</td>
</tr>
<tr>
<td>25V30</td>
<td>1000</td>
<td>873</td>
<td>781</td>
<td>698</td>
<td>560</td>
<td>454</td>
<td>373</td>
<td>312</td>
<td>264</td>
<td>198</td>
</tr>
<tr>
<td>35V30</td>
<td>1000</td>
<td>914</td>
<td>846</td>
<td>782</td>
<td>668</td>
<td>574</td>
<td>498</td>
<td>435</td>
<td>384</td>
<td>306</td>
</tr>
<tr>
<td>45V30</td>
<td>1000</td>
<td>946</td>
<td>900</td>
<td>855</td>
<td>772</td>
<td>698</td>
<td>633</td>
<td>577</td>
<td>528</td>
<td>449</td>
</tr>
</tbody>
</table>

Table (c)

<table>
<thead>
<tr>
<th>Policy values</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
<th>6%</th>
<th>8%</th>
<th>10%</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V30:15</td>
<td>1000</td>
<td>900</td>
<td>843</td>
<td>791</td>
<td>695</td>
<td>611</td>
<td>538</td>
<td>473</td>
<td>416</td>
<td>322</td>
</tr>
<tr>
<td>5V30:30</td>
<td>1000</td>
<td>700</td>
<td>586</td>
<td>491</td>
<td>349</td>
<td>250</td>
<td>180</td>
<td>131</td>
<td>97</td>
<td>54</td>
</tr>
<tr>
<td>15V30:30</td>
<td>1000</td>
<td>882</td>
<td>802</td>
<td>728</td>
<td>598</td>
<td>489</td>
<td>399</td>
<td>325</td>
<td>265</td>
<td>178</td>
</tr>
<tr>
<td>25V30:30</td>
<td>1000</td>
<td>962</td>
<td>931</td>
<td>899</td>
<td>837</td>
<td>778</td>
<td>721</td>
<td>668</td>
<td>618</td>
<td>529</td>
</tr>
<tr>
<td>5V30</td>
<td>1000</td>
<td>538</td>
<td>423</td>
<td>339</td>
<td>229</td>
<td>163</td>
<td>121</td>
<td>92</td>
<td>73</td>
<td>48</td>
</tr>
<tr>
<td>15V30</td>
<td>1000</td>
<td>785</td>
<td>669</td>
<td>572</td>
<td>426</td>
<td>324</td>
<td>253</td>
<td>202</td>
<td>164</td>
<td>116</td>
</tr>
<tr>
<td>25V30</td>
<td>1000</td>
<td>860</td>
<td>766</td>
<td>683</td>
<td>547</td>
<td>444</td>
<td>366</td>
<td>306</td>
<td>260</td>
<td>196</td>
</tr>
<tr>
<td>35V30</td>
<td>1000</td>
<td>908</td>
<td>838</td>
<td>774</td>
<td>661</td>
<td>569</td>
<td>494</td>
<td>432</td>
<td>381</td>
<td>305</td>
</tr>
<tr>
<td>45V30</td>
<td>1000</td>
<td>943</td>
<td>896</td>
<td>851</td>
<td>768</td>
<td>694</td>
<td>630</td>
<td>575</td>
<td>527</td>
<td>449</td>
</tr>
</tbody>
</table>
Mr P. A. C. Seymour, introducing the paper, said that the Working Party had been asked to consider possible modifications of the valuation method embraced in the six principles which, when combined with assets taken at market values, would ensure a reasonable standard of adequacy in times of rapidly changing interest rates, and which could be expressed in statutory rules.

Mr Seymour said he would mention three points which arose in the Faculty discussion the previous week. In Table (a) of Appendix 2 asset values were tabulated based on discounting the net interest receipts and the gross redemption value at the net valuation rate of interest. It had been suggested the previous week that in practice the market value of the stock would be lower, being determined by discounting the gross interest and redemption proceeds at the gross rate of interest. While that might be true, it was not really relevant. As stated in § 5.4.8 the valuation interest rate should be based upon the net redemption yield, not upon the gross redemption yield net of tax.

As could be expected, there had been some speakers who favoured the gross premium method. As had been demonstrated in Appendix 5, a gross premium method was extremely sensitive to a difference in the interest rate between the premium basis and the valuation basis. Furthermore, there was great difficulty in deciding what should be laid down in the regulations as a reasonable allowance for future bonuses and expenses. One suggestion to deal with the negative value problem, which had been heard from several gross premium supporters, was that a lapse assumption should be built into the valuation. It had been claimed that such an assumption had the effect of reducing the mean term of the liabilities, making it more feasible to match and reducing the negative values arising. Apart from the difficulty of deciding on what lapse assumption to make, there were other dangers which might be illustrated with a topical example, the income bond.

Mr Seymour felt that the correct matching procedure was to invest in negotiable securities yielding the required fixed income and redeemable on the maturity date for the required amount. The surrender values should then be based on the value of such assets at the time of surrender. It seemed quite wrong to guarantee surrender values in sterling, and then invest some of the assets shorter to cover an estimated lapse rate. If more lapses occurred than expected there was mismatching to the surrender values, and if less lapses occurred there was mismatching to the maturity values. Furthermore, selection against the office would tend to aggravate losses. The point was that it was impossible to match surrender and maturity values at the same time; lapses should therefore be ignored in the matching policy.

At the Faculty meeting it had been stated that practicalities should not be forgotten. It had, for example, been suggested that condensing a valuation into a single present value was not very informative. While it would be preferable to conduct a valuation on an emerging cost basis looking at the projected revenue account year by year, it was very difficult to imagine a set of regulations based on such a method. Furthermore the computer systems required would be complex and costly.

Mr Seymour apologised for the fact that the working party was not able to cover any special classes of policy in detail. They had felt that it was better to centre on the main problem, namely, whether the net premium method was suitable for the most common classes rather than divert energies in other directions. Since the original Bill almost two years previously, a number of companies had got into difficulties, and there might be great pressure to finalize the necessary regulations.

Mr B. J. Brindley, in opening the discussion, said that the paper provided a useful summary of the background and circumstances of solvency valuation. It also gave some interesting ideas for possible adjustments of the net premium method of valuation. He endorsed what Mr Seymour said about the terms of reference. They were very specific on both sides of the valuation balance-sheet. On the assets side they were restricted to market values. On the liabilities side they were...
asked to consider the desirability and possibility of a modification of the method of valuation embraced in the six principles. Mr Brindley wished to begin by considering the liabilities side of the valuation balance sheet, and take in turn each of the six principles to see what the paper had to say about them.

To deal with the less difficult first, in § 5.7.1 the paper pointed out that the second principle, a maximum 3% zillmer adjustment, 'seems quite adequate'. That seemed a very reasonable figure. The third principle stated that the net premium should be tested against the office premium, and that the difference should be sufficient to meet renewal expenses, including an allowance for inflation. In §§ 5.8.1 and 6.4 the authors commented on the difficult position of an actuary when considering the possibility of runaway inflation. Such a situation would, however, have such widespread implications for the whole financial sector of the economy that other, much more serious effects, would occur first, such as wholesale surrender. Perhaps the Department could give some guidance as to a 'reasonable' inflation rate. The fourth principle was clearly acceptable, namely, that recognized tables of mortality and morbidity should be employed. The importance of the sixth principle, namely, that surrender values which were guaranteed should be covered by market values, had been very firmly demonstrated by the industry's recent unhappy experiences. There were very real problems created when market values fluctuated, from which the subject of matching followed.

The bulk of the paper was directed towards the first and fifth principles, namely, that the basic valuation method should be the net premium one, and the rate of interest should be that earned by the fund on market values.

In his original paper (J.I.A. 92, 75) which set out those principles on solvency valuation, Mr Skerman was very specific concerning one reason for choosing a net premium valuation. That was to try to ensure that the amounts included in the future premiums for future bonuses should be available for future profits and not capitalized. That idea contrasted sharply with a minimum solvency criterion for a typical with-profits office where ‘minimum’ meant the ability of such an office to meet its strictly contractual liabilities only.

Mr Brindley said he had tried to examine the first and fifth principles to see whether they met that requirement (see tables below). Companies A and B had identical liabilities, and were well-established mutual companies with a 4½% compound reversionary bonus. Those liabilities would be typical of a high proportion of U.K. companies. Company A pursued an investment policy of complete immunization and Company B immunized the contractual benefits, both by investing in cash and irredeemables. The figures in the 6% columns showed that the proposed rules did not satisfy the criterion of protecting policyholders' future bonus expectations. That was on the basis of V1. Since V2 and V3, which were given in §§ 5.2.3 and 5.2.4 gave weaker reserves, they would be even more inappropriate.

<table>
<thead>
<tr>
<th>5-year period</th>
<th>Liability outgo (Companies A &amp; B)</th>
<th>Asset income (Company A)</th>
<th>Asset income (Company B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Guaranteed</td>
<td>Non Guaranteed</td>
<td>Total</td>
</tr>
<tr>
<td>1975–79</td>
<td>70</td>
<td>39</td>
<td>109</td>
</tr>
<tr>
<td>1980–84</td>
<td>119</td>
<td>142</td>
<td>261</td>
</tr>
<tr>
<td>1985–89</td>
<td>130</td>
<td>214</td>
<td>344</td>
</tr>
<tr>
<td>1990–94</td>
<td>199</td>
<td>267</td>
<td>466</td>
</tr>
<tr>
<td>1995–99</td>
<td>168</td>
<td>290</td>
<td>458</td>
</tr>
<tr>
<td>2000–04</td>
<td>–11</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>2005–09</td>
<td>130</td>
<td>285</td>
<td>415</td>
</tr>
</tbody>
</table>

It might be of interest to consider what happened if interest rates changed. Looked at on the internal bonus reserve valuation basis, everything was still fine. When the proposed principles were applied, the results varied and Company B, when interest rates rose to 7½%, appeared insolvent. They were circumstances analogous to those ruling at that time though less extreme, and it could be imagined it was for that reason that the authors had considered ways to weaken the net premium reserves. It was certainly possible to reduce the reserves for Company B by,
**Valuation results**

Company A: Fully immunizes  
Company B: Immunizes guaranteed benefits only; balance invested in ordinary shares

<table>
<thead>
<tr>
<th>Liabilities</th>
<th>PNP</th>
<th>6%</th>
<th>IBR</th>
<th>S</th>
<th>7½%</th>
<th>IBR</th>
<th>S</th>
<th>4½%</th>
<th>IBR</th>
<th>S</th>
<th>7½%</th>
<th>IBR</th>
<th>S</th>
<th>4½%</th>
<th>IBR</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP guaranteed benefits</td>
<td>546</td>
<td>208</td>
<td>448</td>
<td>162</td>
<td>399</td>
<td>274</td>
<td>492</td>
<td>546</td>
<td>208</td>
<td>483</td>
<td>162</td>
<td>324</td>
<td>419</td>
<td>545</td>
<td>324</td>
<td>419</td>
</tr>
<tr>
<td>Future bonus at 4½%</td>
<td>160</td>
<td>96</td>
<td>135</td>
<td>80</td>
<td>125</td>
<td>107</td>
<td>143</td>
<td>160</td>
<td>96</td>
<td>141</td>
<td>80</td>
<td>133</td>
<td>107</td>
<td>157</td>
<td>107</td>
<td>157</td>
</tr>
<tr>
<td>NP</td>
<td>706</td>
<td>723</td>
<td>583</td>
<td>566</td>
<td>524</td>
<td>926</td>
<td>635</td>
<td>706</td>
<td>723</td>
<td>624</td>
<td>566</td>
<td>571</td>
<td>926</td>
<td>696</td>
<td>926</td>
<td>696</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assets</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Cash</td>
<td>658</td>
<td>675</td>
<td>540</td>
<td>540</td>
<td>901</td>
<td>901</td>
<td>1400</td>
<td>273</td>
<td>273</td>
<td>218</td>
<td>218</td>
<td>218</td>
<td>364</td>
<td>364</td>
<td>364</td>
<td>364</td>
</tr>
<tr>
<td>Gilt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ordinary</td>
<td>706</td>
<td>723</td>
<td>588</td>
<td>588</td>
<td>949</td>
<td>949</td>
<td>949</td>
<td>706</td>
<td>723</td>
<td>554</td>
<td>554</td>
<td>1065</td>
<td>1065</td>
<td>1065</td>
<td>1065</td>
<td>1065</td>
</tr>
<tr>
<td>Interest income (net)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>2.88</td>
<td>3.60</td>
<td>2.16</td>
<td>41.86</td>
<td>2.33</td>
<td>3.88</td>
<td>41.86</td>
<td>2.33</td>
<td>3.88</td>
<td>3.88</td>
<td>3.88</td>
<td>3.88</td>
<td>3.88</td>
<td>3.88</td>
<td>3.88</td>
<td>3.88</td>
</tr>
<tr>
<td>Ordinary</td>
<td>43.40</td>
<td>43.40</td>
<td>43.40</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
</tr>
<tr>
<td>Total</td>
<td>43.40</td>
<td>43.40</td>
<td>43.40</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
<td>35.14</td>
<td>34.67</td>
</tr>
<tr>
<td>Yield on Market Value (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>6.00</td>
<td>7.50</td>
<td>4.50</td>
<td>4.80</td>
<td>6.34</td>
<td>2.21</td>
<td>4.80</td>
<td>6.34</td>
<td>2.21</td>
<td>4.80</td>
<td>6.34</td>
<td>2.21</td>
<td>4.80</td>
<td>6.34</td>
<td>2.21</td>
<td>4.80</td>
</tr>
<tr>
<td>Gilt</td>
<td>5.50</td>
<td>7.00</td>
<td>4.00</td>
<td>4.30</td>
<td>5.80</td>
<td>2.70</td>
<td>4.30</td>
<td>5.80</td>
<td>2.70</td>
<td>4.30</td>
<td>5.80</td>
<td>2.70</td>
<td>4.30</td>
<td>5.80</td>
<td>2.70</td>
<td>4.30</td>
</tr>
<tr>
<td>Ordinary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5.50</td>
<td>7.00</td>
<td>4.00</td>
<td>4.30</td>
<td>5.80</td>
<td>2.70</td>
<td>4.30</td>
<td>5.80</td>
<td>2.70</td>
<td>4.30</td>
<td>5.80</td>
<td>2.70</td>
<td>4.30</td>
<td>5.80</td>
<td>2.70</td>
<td>4.30</td>
</tr>
</tbody>
</table>

Notes:  
PNP—Published Net Premium Valuation at 2½%  
IBR—Internal Bonus Reserve Valuation at the ruling rate of interest  
S—Solvency Valuation  
Asset values are book for the PNP and market for the IBR and S valuations  
The market value of ordinary shares reproduces a discounted income value assuming 2% growth in dividend income and also assuming they are treated as perpetuities.
for example, using $V_2$. The rationalization of the logic underlying the formula was not particularly easy to apply.

The apparent problem of Company B when interest rates rose could be solved or exacerbated if fluctuating ordinary share values were introduced. A 50% increase in ordinary share values was more than sufficient to turn Company B into an 'adequate' company. With the experience of the previous fortnight's activity of the ordinary share market fresh in the mind, it demonstrated clearly how difficult a concept it was to compare any capitalized current value of liabilities with such volatile market values. Unfortunately, there was no way in which one could stop market values having a disproportionate importance in the minds of Government or financial commentators, even though it was only in special circumstances (for example, where there were guaranteed surrender values) that they were relevant.

An example of a company which would apparently be solvent on the rules applied as they stood, would be a new company which had invested, say, entirely in War Loan. It might be earning 16% or 17% on its assets and so could justify valuing at perhaps 15% gross or 9% net. Its solvency on that basis would have little bearing on its true solvency.

The other great weakness of the principles was that they did not tell the authorities much about matching. An example was two companies with income bond liabilities. One company had exactly matched with a small profit. The test showed insolvency because of the margin in the interest rate. The other invested in cash and deposit rates had been high. The test showed it to be solvent. The truth was that the first company was solvent and the second company might or might not be.

In § 5.3.2 the authors of the paper avoided the question of comparing actual assets of specific term to run with the liabilities. Yet that was one of the vital elements of any opinion concerning the ability of a company to meet its liabilities. Any set of regulations that ignored that point were necessarily weakened, and it was not sufficient to say that repeated satisfaction of the rules in changing circumstances made that unnecessary. For example, a company which invested short could have passed the proposed test since the war and still remain only conditionally solvent or adequate.

The profession should try to direct attention towards the right questions and true uncertainties. They were concerned with future cash flows. A schedule of emerging costs did not involve prohibitive work. Starting from the present Schedule 5 the calculations were not particularly long, and Mr Seymour's remarks on that subject rather over-stated the case. Mr Brindley suggested only aggregate liabilities split between contractual and future bonus payments, together with asset income split by asset type. He did not suggest any calculations based on those emerging costs. The Department must have necessary resources to examine such information. Those resources need not be enormous. For the major established companies the examination would need only to be cursory. For the smaller companies and those in special situations, it would direct the Department's attention in the correct way. Perhaps even more important, it would make their managements more conscious of the results of their company strategies.

To construct a valuation balance sheet with market values on one side and any single figure on the other would be a gross over-simplification. Any actuary would need to know a great deal more before he would be prepared to give an opinion on the company's adequacy. That endorsed the conclusion of the paper in § 6.5 that a flexible and realistic attitude was essential from the Department.

Mr P. R. Smith would have liked to be sure precisely what was the purpose of the regulations under discussion. The authors stated in § 5.1.2: 'Whilst this may be true it must be remembered that the authorities are not seeking a mere demonstration of solvency but wish to establish a standard of good conduct.' He was delighted if that were so, but he did not know on what authority that statement was made. The Consultative Note No. 10 set out the purposes for which the statutory bases were to be applied, one of which was clearly stated to be solvency. Reference to Section 12(2)(b) of the Insurance Companies Amendment Act 1973, later Section 28(2)(b) of the Insurance Companies Act 1974, referred to the Secretary of State not being
satisfied that the value of the assets representing the fund or funds maintained in respect of long-term business exceeded the amount of the liabilities. It seemed quite clear, therefore, that what was alleged to be at stake was solvency. If in fact that were not so, Mr Smith would welcome it being made quite clear in the regulations.

He regretted that the terms of reference of the working party were such as to confine it to consideration of a net premium valuation basis. A paraphrase of the terms of reference might read: How can the pure milk of the net premium valuation be adulterated with enough common sense to give reasonable results. He was not surprised that the authors confessed themselves defeated!

Mr G. E. Barrow said he was an original member of the working party but he had been absent for about 5½ weeks out of the nine which the working party devoted to the paper. Therefore, he took only a minor part in the drafting of the earlier parts of the paper, and none in reaching the conclusions. His fellow authors, knowing that he was thinking on somewhat different lines from their own, had agreed that he should be free to offer his own comments, and not be bound by their conclusions. Such differences of approach as there had been stemmed from the restrictions which the President and the President of the Faculty placed on the working party by the terms of reference. Those limitations were not unrealistic having regard to the current situation.

He did not dissent strongly from their conclusions, but was of the opinion that the regulations would be better based on $V_2$ as set out in § 5.2.3., subject to the further comments in § 5.3.9. In § 5.3.7 the comment was made that the method veered towards paid-up policy matching. It seemed to him that strict paid-up policy matching implied reinvestment at rate $g$ and not at $i$; $g$ should take account of the unexpired term of the components of the existing portfolio of assets and $i$ should meet Ammeter's requirements (see § 3.3.6). If, in order to obtain modification of the proposed regulations on those lines it was necessary to accept a recommendation as to the maximum rate of $i$, if the Department felt that to be a necessary condition, Mr Barrow would not regard that as too high a price to pay. He hoped that such limited modifications would be accepted.

It had already been pointed out that there was more than a semantic difference in the description and the purpose of the regulations. It was necessary to be quite certain whether the purpose was to establish solvency or a standard of good conduct or adequacy. It should be noted that he did not say 'mere solvency'. In present circumstances a conclusive demonstration of solvency might be an extremely rigorous test. The two sets of regulations, assets and liabilities, derived from the six principles, and it might be useful to pause to consider the purpose for which the six principles were originally developed. They were to enable the traditional type of U.K. office to demonstrate to their continental counterparts that the very different practice both as to life assurance and statutory supervision which had developed in the United Kingdom as compared with Continental Europe could be reconciled on principles which were quite clearly understood by both. The impetus for this rapprochement had been a farsighted recognition of the fact that the destiny of the United Kingdom lay with Europe.

But, for that purpose, it was unacceptable to capitalize future bonus loadings on existing business as it would produce too low a liabilities valuation. Actuaries in the UK. could have seen little objection in conceding that point, particularly as it was supported by a sound domestic reason, namely that were it permitted to capitalize future bonus loadings, it would be an invitation to the asset stripped, that bugbear of the fifties and sixties. Further, it had then seemed inconceivable that asset values could fall to a point at which well-managed offices might be embarrassed. When the regulations came to be made it had seemed entirely natural to put forward the six principles, even though Skerman had, at least in part, envisaged the consequences of sustained high-interest rates leading to very depressed security prices. But prices had fallen and fluctuated, and even long-established offices having undoubted strength derived from uncommitted free assets and existing bonus loadings felt that the bonus prospects of existing business might be squeezed.
What in those circumstances were they to do? Should they reduce their rate of bonus on existing business? That seemed to be a wrong reaction when high rates of interest improved the prospects of existing policyholders. Should they switch their investments into others such as dated gilt-edged which showed up better under the asset valuation regulations? There was, it was understood, some evidence that such switches were taking place. It seemed to be nonsensical for an office which had sufficient free assets to cover any adverse consequences of its policy of investing for the long term to be pressed into artificial contra action. Was such an office to apply to the Secretary of State for a dispensation under Section 57 of the 1974 Act? They might get a dispensation in respect either of assets or liabilities. It was possible that the Department might be prepared to accept dated gilts on an amortized basis between cost and par, provided the gilts were matched to liabilities, and further that the office was able to demonstrate that the chance of having to realize them on a forced sale basis was remote. But either way, whether dispensation was guaranteed in respect of liabilities or assets, formal application would have to be made to the Secretary of State. Probably the majority of appointed actuaries would elect to apply for such a dispensation, concerned as they were with achieving equity to policyholders. It was far from certain that they would be supported in that judgment by the directors of the office, who might take a different view based on considerations of overall policy, because it seemed inevitable that if an office made an application for dispensation under Section 57, the auditors would qualify their certificate. Admittedly such a qualification need be only of a technical nature, but how was the public at large to distinguish between a technical qualification in respect of a very strong office, and a qualification which had a real meaning in an office the solvency of which was only marginal? Mr Barrow, therefore, had misgivings about the possible long-term effects, even on major offices, of compliance with the regulations as drafted.

Further, they seemed unpredictable in their application in offices of the non-traditional type, much of whose business would fall to be dealt with under Rule 8. It was necessary to be quite clear that, taken in conjunction, the two sets of regulations did not specifically set out to provide a standard of solvency for every office. Broadly, they demonstrated a standard of good conduct and, for offices of the traditional U.K. type, provided inter alia a demonstration of solvency.

It would probably be conceded that although the Insurance Companies Act, 1974, taken as a whole was directed towards producing a standard of adequacy and good conduct, the returns to be made should be specifically designed to establish solvency for all types of office, and that was not necessarily a lesser standard, a mere test of solvency; for certain offices with substantial alternative guaranteed benefits a really rigorous solvency test could be a very severe test indeed.

It was salutary to reflect on the circumstances in which, for the first time in the United Kingdom, the Secretary of State had been given powers to prescribe valuation bases. Those powers were given by Parliament, with hardly a single dissentient voice of any significance, by reason of public disquiet. In Mr Barrow's view, the political intention was clear. The powers were intended to be used specifically to establish solvency for the protection of the U.K. policyholder.

But, it might be objected, the Secretary of State was also given power to ensure that the reasonable expectations of present and future policyholders were safeguarded. That would not be achieved if offices were permitted to capitalize future bonus loadings. To that Mr Barrow would answer that that power was given by a different section of the Act, and was a separate function. Monitoring that aspect of an office's affairs could not follow automatically from a single set of returns designed to establish solvency, but needed to be the subject of separate questions to the actuary. There was more than one way of depriving the policyholders of a mature office of their rightful expectations, and capitalizing future bonus loadings was merely the crudest and most obvious. The Department's powers to sanction changes of control ought to eliminate the danger of an unscrupulous entrepreneur gaining control of a mature office in order to realize the estate.

In the time scale available, it might be necessary to accept the regulations with only minor
of the Liabilities of Long-term Insurance Business

modifications, but it was to be hoped as an interim measure only, whilst research was continued for something more directly relevant to the essential issue. What should such a test be? It seemed that what had to be established was that the office was able to meet its contractual liabilities to policyholders even in adverse circumstances, and the same test had to be applied impartially to all offices. Under annual premium contracts each policyholder had the choice of: (i) discontinuing premiums, or (ii) continuing to pay premiums as they fell due, but if the policyholder elected to continue to pay premiums, he must pay the contractual premium. Unlike a mortgage repayment, the policyholder had no effective power to renegotiate the terms if financial conditions had changed to his advantage. If, therefore, the proportion of the contractual benefits which future premiums could provide were calculated at rate \( i \), with a realistic allowance for expenses over and above renewal commission, the complement of that sum was the minimum benefit which must be deemed to have been secured by premiums paid to date.

In practice, the contractual paid-up benefit already secured might exceed the minimum accrued benefit derived as above and, if so, the higher figure was the one which needed to be tested against the assets which had been accrued out of premiums paid to date, valued on a 'quick asset' basis. It should be assumed that each policyholder would exercise his option to continue or discontinue premiums in the manner most onerous to the office, which might not necessarily be the one most beneficial to himself. Provided it was recognized that the sole purpose of such a valuation was to demonstrate solvency, it did not seem to be objectionable if an office were allowed to capitalize part of its future bonus loadings on existing business. In order to be able to obtain any substantial degree of relief an office would have to have a considerable proportion of its business written at substantial premiums. Such an office would have little difficulty with a solvency test, and would be able to choose its assets without too much regard to their 'quick asset' value, as opposed to their prospective investment worth. Was that an adverse consequence?

By contrast an office which was not so strong, with a large volume of non-participating business written at fine premium rates, would need to choose its assets very carefully. Again, was that undesirable? Did it not accord with reality?

If a solvency test showed an office to have an uncomfortably small surplus of assets over liabilities, there would have to be a further investigation to test its ability to meet its obligations in a 'run-off' situation. He made the point specifically because in such a situation certain assets might not produce the values given by the asset valuation regulations. The very nature of such a solvency test would deter even mature offices from issuing marginal contracts and should have generally beneficial effect.

It might be necessary to accept regulations in the form proposed, but research should be continued into the essential question of solvency in relation to long-term business. Were the returns intended to show good conduct or solvency?

Mr T. G. Arthur was in strong disagreement with the proposals and some of the major points made in the paper.

He disagreed with the statement in § 5.1.2 that a standard of adequacy, over and above solvency and excluding shareholders' funds, was required. Indeed, nothing could more effectively protect the establishment than that. He disagreed with the implication in § 5.4.3(1) that the state of the fund on the valuation date should have a bearing on the valuation rate of interest, with the remarks about bonuses and equity dividend growth, and with the method of calculating the overall yield on the fund as advanced in § 5.5.6. He felt also that the terms of reference were cast too narrowly.

On the question of a net premium valuation versus a gross premium valuation, Mr Arthur said that net premium was a misnomer, since the implication was that the only difference between it and the gross premium was expense loadings, whereas the real difference was whether the interest rate was the current market rate or the rate at which business was written. He would therefore refer to the net premium method as the notional premium method. The authors demonstrated, perhaps more graphically than he could, the disadvantages of any
notional premium method, adjusted or otherwise. He considered three statements, taken directly from the paper and paraphrased: consistent treatment of assets and liabilities was a fundamental principle (§ 4.1); with a conventional notional premium formula it was not possible to secure consistent treatment of assets and liabilities (§ 5.1.5); none of the suggested modifications to the notional premium method were generally applicable (§ 5.3.16).

If those three statements did not together condemn the net or notional premium method or any variation of it, then it was difficult to know what did. How could the situation about any company be discovered, with a margin or without one, when it was pretended that the revenue it was receiving was irrelevant, and an accident of past conditions? Indeed, to complete the farce Mr Arthur said he would like to propose the notional sum assured method, in which it was pretended that the money to be paid out was irrelevant, as an accident of past conditions, and adjust the sums assured to reflect current market conditions instead of the premiums.

The authors, however, also condemned the gross premium method, this time unjustifiably in his opinion: the gross premium method was a shorthand way of expressing emerging cost results. The reasons for the condemnation of the gross premium method in the paper were twofold. The first was found in § 5.1.2 where it was admitted that the gross premium method had its attractions, but it was then argued that something more than mere solvency was required. The implication was that a gross premium method could not be used to demonstrate the 'something more' but such an assertion was a non sequitur and quite without foundation. In the next paragraph a similar error was committed when it was stated that a gross premium method must either count bonus loadings as an asset or make provision for specific solvency margins. It need not do either, and, indeed, Ammeter's paper, which the authors cited as a condemnation of the gross premium method, did not dismiss a gross premium method provided it was what Ammeter called 'natural' as opposed to 'mechanical'.

The second criticism of the gross premium method was that it produced enormous negative values, as stated in § 5.3.13. But what was wrong with enormous negative values? If interest rates had risen significantly since the business was written, then it was a fact that if current market conditions persisted (and taking assets at market value made that assumption) many policies would show a profit to the insurer if they remained on the books. Negative values merely acknowledged that fact and a fudged basis which swept them under the carpet could not be realistic. It might well be decided that some of those negative values should be eliminated and it might well be admitted that deciding how much to eliminate was a problem; but that was no reason for pretending the problem was not there. The question of how much to eliminate was of course bound up with lapse rates.

The third criticism of the gross premium method was mentioned by Mr Seymour, and in response to his request for constructive proposals, Mr Arthur suggested that the simplest way of treating expenses and bonus loadings was to allow for both explicitly as liabilities, and to take the whole premium as an asset on the other side.

The authors paid some attention to immunization theory, but concluded that it was dangerous in practice because it did not work with large fluctuations in yields, because it ignored taxation, and because at high interest rates continuing business could not be immunized. The taxation point could, however, be dealt with. Their point about large fluctuations in conditions making immunization impossible covered up the deficiency of the net or notional premium method, where immunization against even small fluctuations was impossible. A gross premium valuation could immunize for quite significant changes, especially if a realistic allowance for lapse rates were made. It was silly to try and immunize assuming that no policies would lapse and then to add back all negative values, hence assuming that many policies would lapse. The answer to the immunization problem and its associated 'matching valuation' was again not to duck it, but to carry out subsidiary calculations showing the extent to which adverse changes in conditions could be tolerated.

The authors delivered the final hammer to that concept however by calling Redington to their support in claiming that it was unrealistic 'because of the situation in Europe'. That was, in Mr Arthur's view, a rather grotesque distortion of Redington's meaning. The realism of
of the Liabilities of Long-term Insurance Business

which he spoke was the actual working of life assurance and investment, which he used to condemn the net or notional premium method. It was emphatically not the mutterings of insurance legislators in foreign countries which, between them, wrote no more business than the United Kingdom, often in very different circumstances. If that were realism, then the 'loss of sovereignty' arguments produced by the anti-Marketeers would have to be looked at more closely.

Mr Arthur fully agreed with what was, in his opinion, the most important remark in the paper, which stated in §6.5 that no set of rules could cover every case, and 'indeed it could be argued there is a danger that in trying to satisfy all, there may be a failure to satisfy any'. Let those concerned then so argue! A good starting point might be the past legislative developments briefly reviewed in §3.2, which made it reasonable to ask the question: Do the regulations follow the insolvencies, or do the insolvencies follow the regulations?

Mr R. B. Leckie (a visitor) said that the actuary had no higher professional obligation than to ensure that the long-term contractual commitments inherent in the products and services he was associated with would be met. All too often that final calling of the profession was not fully appreciated nor had the underlying theory been adequately explored. The actuaries on the other side of the Atlantic welcomed the further development of solvency theory as presented through the paper submitted to the meeting. It was valuable, not only for its original thoughts, but because it suggested to each of those concerned wherever there might be the need to re-examine the principles and practices previously followed.

Mr Leckie said he wished to supplement §2.3 by supplying some of the background and principles that had guided the solvency and control regulations in North America. Some of the points might be germane to the discussion and to the considerations which ultimately translated into regulations in the United Kingdom.

In North America it had always been felt necessary to control the operations of business to a greater extent than had been considered necessary in Europe. As life insurance developed in America, both the actuaries and regulators endeavoured to ensure that companies would be able to carry out the contractual arrangements entered into. It was recognized that the provisions of the contract were of a long-term nature and that the benefits were indivisible and non-cancellable. Thus control and regulation tended to develop to ensure the full and continuing provisions of the contract with reserves and liabilities of a company valued conservatively to guard against reasonable future contingencies. Net premium valuation was a natural evolution. Following an investigation of the life insurance business at the turn of the century, American supervisory authorities introduced the requirement of cash values to provide to voluntary terminators a reasonable return of their proportionate financial rights. Guaranteed cash values had since become an integral part of the North American life insurance system—a system based on assured performance, first to provide the protection specified and then second as a quality savings medium. It was recognized then, as it was now, that cash values were not necessarily an equitable discharge of an insurer's obligation for it assigned no value to insurability, or to premium and expense and interest guarantees, or to certain contractual provisions and settlement options. Thus the right to terminate before the completion of the contract was one which belonged to the policyholder not to the insurer, either at the instigation of the insurer or because the office had failed. To discontinue life insurance coverage for policyholders of an insolvent company would be unjust and improper. That, and the indivisible nature of the contract, had led to a going concern solvency test.

It was recognized in North America, as it was in the U.K., that the most important element in a solvency test was the quality and earnings potential of the assets. However, the difference was that the final test for the adequacy of assets had followed from the method for determining liabilities. In Canada the statutory basis for actuarial liabilities was as described in §2.3.1. The basic test for assets was market values modified for amortization of mortgages and government securities. There was also a modified three-year averaging provision for other bonds and shares to provide relief during temporary periods of depressed market or unusually high interest
Proposals for the Statutory Basis of Valuation

Proposals for the Statutory Basis of Valuation

rates. Most companies held investment reserves or would write down assets below permissible values to absorb future fluctuation. There were, as noted in the paper, restrictions on the amount of assets invested in shares and in real estate.

The paper pointed out that restrictive valuation regulations stifled innovation and limited growth, and that would be harmful to the industry and those served. While those in Canada agreed with that sentiment, it had been found that reasonable regulation gave the freedom to pursue new courses in a responsible way without jeopardizing the foundations upon which all depended.

Turning to the proposed tests in the U.K., the regulations for assets were designed principally to ensure the meeting of break-up obligations while the termination of liabilities described in the paper was derived from the test for assets. In the terms of reference to the working party it was stated: '. . . to ensure a reasonable standard of adequacy rather than a mere demonstration of solvency'. Thus recognition was given to the desirability of a test to avoid insolvency rather than to inform on it as a fact—in which case full obligations could not be met. It followed from that consideration of continuity that some kind of averaging provision ought to be permissible to cover interim contractual policy obligations. Thus the actuary should be entitled to employ a withdrawal rate in his recognition of guaranteed cash values. That could be done by having the actuary determine, in addition to the calculated reserve ignoring guaranteed values, a reserve for the value of contractual benefits not accounted for, utilizing suitable withdrawal tables in his calculation. In fact, some leeway appeared available to the actuary in the Department's proposals—see Rule 7 in Appendix 1.

A second point that should be noted was the possible risks involved in having the valuation of liabilities follow those of assets. The future return of equities could not be guaranteed and to assume that current dividends would be met in the future might be unduly liberal for a test of solvency. Further, the overall return on any portfolio of investment was a function of many factors not the least of which was the quality of that portfolio. Thus it might be thought that the rate of interest to be employed in the valuation of liabilities should be a function of the lesser of the rate obtainable on gilts, or the actual portfolio rate of the company. It should be noted that a company just failing the solvency test might have been able to meet the test by replacing one of its low-yielding highly secured investments with a weaker but higher yielding one (particularly if an in-force yield rate were adopted), thus possibly encouraging the very thing the solvency test was supposed to prevent—the weakening of the company's ability to meet its future obligations.

There was no question of the desirability of matching assets to liabilities. However, it was difficult to see how reasonably effective immunization could be achieved if there were substantial equities or even real estate among the assets. Neither the income nor the principal was guaranteed. On the other hand, mortgages repayable on an amortization schedule, serial maturity bonds, and perhaps even a few gilts were ideal as matching assets.

The need which had prompted the paper should be met. It was imperative that actuaries throughout the world recognized the obligations they had to the public served through life insurance, and that it was possible to say to the world 'our resources are sufficient to meet all future obligations'.

Mr F. M. Redington said that when he was actuary to his company, he had solemnly promised his opposite number, Mr Leslie Brown, that if they had difficulty with the asset certificate, then he would endure the inspissated gloom of a bonus reserve valuation. Of course, in those days the paths were narrower, so freedom of valuation was thought of as an active companion. Without that promise, terminal bonuses might never have been introduced in 1956.

In days of high bonus the importance of valuation freedom might not seem so vital, but Nemesis did not sleep, (he instanced guaranteed surrender values), and was probably then watching.

To start at the beginning, two questions had to be answered. Was the company solvent? Was the surplus fair? Taken separately each of those questions was so easily answered with a self-consistent set of principles and bases, that all that remained to Council was to remove the
subject from the Final to the Intermediate! But all the sweat and toil which had been expended over the years had been in pursuit of a chimera—a single valuation system which would answer both questions in all circumstances. Not all the Councils, nor all the polysyllabic torrents in the world would ever find one. So, there was the situation again, with yet another single valuation compromise, and as always the question was just how tolerable was that particular compromise? To measure what was lost by a compromise it was necessary to have some idea of the ideal. He had been fortunate enough to use the simple two-answer system, one public and one private.

For fair surplus book values of assets were used, and what might be called 'book values of liabilities', that is each year's new business was launched on its appropriate true net premium basis, and the truth was left to unfold. Mr Redington said he had a deep affection for that philosophical friend.

For solvency, or perhaps one should say strength, the market value of assets was used with a bonus reserve valuation. A bonus reserve valuation was a pretty toy for those who liked power tools, but it only said what it was told to say, so it was of little help as to the direction to be taken. But it was very eloquent about the current position. Thus, when compared with market values of assets—on consistent bases of course—it described the office's strength.

The proposals under discussion were similar in that they had book and market value of assets, but instead of the true passive net premium valuation plus bonus reserve valuation, there was the compromise of the single hybrid net premium valuation described in the proposals. The use of words with false overtones was the typical way by which viruses entered disease-prone minds. Those liabilities were net-premium in the merely technical sense that they rose from 0 to 100, but in no other way was that the net-premium system as it had been known. That was not Mr Redington's quiet philosophical friend, but a harassed minion anxiously chasing the assets. Thus one casualty of the compromise was that the use of the basis to chase solvency undermined its value to control a proper surplus.

He was even more uneasy at the other side of the medal, solvency, where a serious fallacy had crept in. One of the deadliest viruses ever to enter the profession was when, 200 years previously, net premium liabilities were called valuations. The word valuation meant an entirely prospectively independent of past history. But that was not true for a net premium calculation which could not be made without knowledge of the past.

The proposals therefore contained a fundamental fallacy. There was no logical justification for comparing market values of assets, which were genuine valuations, with net premium liabilities, which were not. The first was a one variable function in time t; the second was a two variable function in t and n. They were on non-intersecting planes of meaning.

The disease was so deep in an actuary's thoughts that it might not be found easy to shake free. Suppose by accident there were two companies which were in an identical prospective position. There was no reason whatever why their net premiums should be the same, that depended on the irrelevant past history of how the two companies got there. Thus a net premium valuation for those two identical companies would be different. One could appear solvent and the other not. That fallacy was implicit in Council's terms of reference. The authors got the right answer in the end—'impossible'. It was perhaps fortunate that 1974 had been a fateful, testing year. It would probably demonstrate that the untrained bloodhound picked up more false scents (young companies, non-profit companies, etc.) than it did the true scent of insolvency.

Mr Redington said he had asked himself whether he had been fair. In one respect he had not. The fallacy of treating conventional net premium liabilities as true valuations was so deep in the blood stream that it could be called established custom. But he did not think that any British life office had been hammered on the evidence of a net premium valuation alone. If that were to happen, it was to be hoped that the profession would rise in anger. In any event, there was all the difference in the world between the casual behaviour of everyday life and the rigorous precision of legislation. The proposals were a compromise and as always the path of compromise was littered with unforeseen and unwanted consequences. Worse still, they in their turn led to improper evasive action which distorted the path of evolution.
Council should give very careful consideration to the possibility of giving two valuations of liabilities—one for each question. That satisfied every possible Government requirement without compromise and distortion, and was good for the profession. If that proved unacceptable, Council should at least make the following submissions to the Department. The consultative note asked that assets and liabilities should be valued on consistent bases, but omitted the more important point that they be on consistent principles. An office could not be condemned on a false equation between a true valuation of assets and a notional calculation of liabilities, and that therefore an office which was under question on the market value of its assets should be allowed to submit, as auxiliary evidence, a truly parallel market value of its liabilities.

Mr Redington said he had often regretted the casual way the profession compressed the varied complexity of its affairs into a colourless present value. If that were his feeling when the angle of the funnel of doubt was narrow, how much more so as it approached 180°. If he could not see six months ahead, what was he doing discounting over 60 years? In short, he had the deepest distrust of present-value calculations. They were powerful headlights which did not illuminate the fog ahead, but dazzled the user and those who listened to him.

As has been stated earlier, two answers to the two questions were needed, but there was one answer that replied to every question—the facts themselves. A return to simplicity should be considered by setting out for each future year, Column 1: Asset income; Column 2: Liability outgo; Column 3: Difference. Mr Redington said he had used that route to the estate calculations in his company's industrial branch. For a typical company it had a distinctive shape positive for some 5 years, negative for the next ten or so, and then positive thereafter. The + - + shape made it very resistant to rough handling.

If one met a country yokel of an actuary whose smallholding was that schedule and asked him about his current valuation problems, he would look puzzled and perhaps say, "Well there were more small problems than usual and expenses were up again, but dividends were unusually good and yield on new money exceptional. On the whole a good year; what problems?" Mr Redington asked who had the rights of it, he, the simple one, or the clever ones. He would rather have that kind of soil running through his fingers than computer tapes.

Mr S. Benjamin said that there were two aspects of an office's operations which were of public concern; were the policyholders' bonus expectations being impaired, and was the office solvent? It was probably not possible to demonstrate both in one valuation. The whole philosophy of each was different. That was why the authors had got nowhere with their paper.

The proposed regulations as he understood it, aimed at both aspects. He had made inquiries in the previous few days. Some actuaries thought the regulations were aimed primarily at solvency, others bonuses and others at both. The regulations should be aimed at solvency.

The danger of the proposals was that for those offices where solvency might be in doubt, the actuary would often need to use a stronger basis. That was nonsense and also could put the actuary in an intolerable position in relation to the proprietors. It was possible to get out of this impossible situation if the Department concentrated on a standard of solvency and called for internal bonus projection calculations when bonus levels might be in doubt.

If the authors had looked at their terms of reference more critically, they would have seen that the various formulae they were discussing were more or less appropriate to solvency. In fact, $V_2$ was very similar to the matching solvency valuation, which they dismissed so quickly at the end of their paper.

Mr Benjamin supported $V_2$ and did not see any inconsistency between what he was about to say and the 'Skerman Principles'. He supported $V_2$ as a starting point, because it accumulated future premiums cautiously to see what benefits they could support. It then required the existing investments to support the rest. The mechanics of $V_3$ could be used provided a margin for future reinvestment was left. He had revalued a company in that way. It was well matched, and the result was very similar to writing up the assets, a method he normally favoured provided surrender values were watched.

Total rigidity was intolerable, because feasibility was the ultimate test and no discounting
of the Liabilities of Long-term Insurance Business

technique could always be a sufficient model. By feasibility, he meant 'could it happen?'. But
total flexibility had now become intolerable. There should be a standard, any departure
from which should be justified. Such a standard and a philosophy of departure should consti-
tute some GAAP (Generally Accepted Actuarial Principles), preferably issued by the Institute.
They would, of course, be an agreed convention. Any given level of solvency would be nothing
more than a convention. He defined solvency as the ability to meet future guaranteed benefits
even in unfavourable future circumstances. That was a strong solvency test. It did not attempt
to nurse a new company at the expense of solvency. The use of a weaker valuation basis because
of the existence of free capital was unacceptable, because it was not a quantified demonstration.
Future increases in reserves on existing business should not depend on the injection of new
capital. That was GAAP no. 1.

There should be a maximum, \( t \), rate of interest on future new money, corresponding to \( i \) in
\( V_2 \), and that rate should be named. That was GAAP no. 2. To say that the yield on new money
which would be available after 10 years for the purpose of solvency was a matter of professional
judgment was nonsense. The paper did not show it, but \( V_2 \) was almost insensitive to \( i \) until the
valuation premium was limited. So the justification of any adjustment became one of examining
the expense loadings and also of investment matching.

GAAP no. 3 was that the reserve should not be less than the guaranteed surrender value
policy by policy. That implied all negative values were individually eliminated.

GAAP no. 4 would name a minimum margin excluding commission between the office and the
valuation premium. He would favour, say 5% gross, if an interest margin were also available,
but it would be necessary to state as an over-riding principle that sufficient margins in total
should be left to support the care and maintenance expenses of a closed fund, including
mortality fluctuation or reinsurance costs and time to switch to a care and maintenance basis.

GAAP no. 5 would state that some mismatching always existed. For with-profits business
that was often advantageous, provided the underlying solvency was not impaired. Therefore a
statement was always required referring to the matching or immunized position. For the
purpose of solvency, he did not like immunization as a working model, and he did not like any
matching which depended on future premium income. Mismatching implied that management
were prepared to switch. The margins to allow before they switched could be in the case of
gilts, the effect of a change in yields. (Even \( V_2 \) was insufficient if the company were invested too
long. That was where 'games' matching theory showed the weakness in \( V_2 \).) In the case of
equities (which were not linked) a drop of one-third in the market value should be assumed
before switching into matching stocks at current yields at any point of time. That could only
make sense in the context of a continuous undertaking by the company to switch according to
the size of the mismatching reserve calculated by reference to those margins.

If an office had to show a thinner valuation loading margin in order to demonstrate that it
could declare its current bonus and remain solvent, that is to say, had to use part of its bonus
loadings, that should not be a cause of concern, provided it was understood that the exercise
was inappropriate as a demonstration of potential bonus earning power. But of course every-
one would be on warning. One formula should not be used in an attempt to do two different
jobs.

Mr R. S. Skerman said the profession should accept that it was appropriate that there should be
statutory regulation of the valuation of the liabilities of long-term insurance business, and that
it should not be left to the unfettered discretion of the actuary. Statutory regulation which
prescribed principles was preferable to one which prescribed bases of interest and mortality.

U.K. legislation required the reasonable expectations of policyholders to be fulfilled. For
with-profit business that meant that reserves should exceed solvency reserves so that if future
premiums were paid, reasonable bonuses would be added, and the word reasonable implied
tolerance as to what was reasonable.

That left a choice between a bonus reserve or an emerging cost valuation which took future
bonuses and future bonus loadings into account, and the net premium basis which ignored
both. The advantage of the net premium method for a statutory basis was ease of definition. It was very difficult to express in legal form principles which should govern a bonus reserve valuation, or an emerging cost approach, although for a solvency standard those approaches were theoretically preferable. A fundamental question therefore was whether the net premium method of valuation was a sufficient approximation to the bonus reserve method to be acceptable for the purpose in hand.

There should be harmony between the requirements for valuing assets and liabilities and that was the aim of the proposed regulations. Market valuation of assets could be criticized as a basis for valuing assets of long-term business either on a winding up or going concern basis, but in a solvency standard the relationship between the value of assets and liabilities was more important than the absolute values placed on them.

The use of market values of assets had the advantage of requiring solvency to be tested at different rates of interest from time to time. The main problem discussed in the paper was whether the liability valuation regulations operated fairly in relation to a market valuation of assets or, in other words, how satisfactory were the rules on assets and liability valuations in comparison with the ideal of a valuation of estimated net cash flow taking asset income and liability outgo together.

Mr Skerman had never thought it possible to define in statutory regulations how the rate of interest used in the valuation of liabilities should be linked with that currently earned on the assets so as to allow for changes in the future in the rate of interest. The allowance to be made depended on the relative length of term of the assets and liabilities for the particular business. The draft rules left that allowance to the judgment of the actuary in that the margin as compared with the yield on the fund was to include 'such further amount as in the opinion of the actuary is necessary to take account of any foreseeable decrease in the yield on the fund during the term of the contracts in force on the valuation date'. He did not think that there was any alternative to the use of judgment in that way.

The net premium method itself and the first two modifications described in the paper would, if based on gross rather than net premiums, be appropriate to different matching situations and assume a length of term for assets which decreased as one moved from V₁ to V₃. They demonstrated the impossibility of arriving at a solution which was applicable to all matching (or mismatching) situations. The proposal that the normal net premium method should be used carried with it the corollary that, if assets were shorter than full immunization, allowance should be made for the possibility of a lower rate of interest in future. Equally, in the unusual case where assets were longer than full immunization, allowance should be made for the possibility of a higher rate of interest in future, and it would be wise to make provision in the rules for that possibility.

All the formulae in the paper were open to the criticism that if a change in the rate of interest were expected in the future and assumed in the valuation, that meant that the premium valued changed. Because an increased rate of inflation with the prospect of higher expenses often accompanied higher rates of interest, a reduction in the premium valued as the interest rate rose was appropriate, but the reduction resulting from changing the rate of interest used to calculate the net premium was likely to be excessive.

As the authors stated in § 5.3.3, the stringency of the net premium method at high rates of interest was tempered by the fact that high rates of interest shortened the mean term of the asset income and reduced the sensitivity of asset values to changes in interest rates when they were high. They gave an example based on a policy value of 5V₃₀ and said that if that were matched by an irredeemable stock, deficits would be eliminated when the interest rate rose to 8% net. But if it were matched to equities or properties and the reverse yield gap was 3% net, the deficit would not be eliminated until the interest rate for fixed interest securities rose to 11% net. Furthermore, because in the situation he had mentioned the yield on the fund would be 3% less than if investments were held in fixed interest securities, the market value of the assets required to match the liabilities according to the draft rules would be some 80% greater than would be required if investments were in fixed interest securities.
That led to the fundamental question of the philosophical basis of the rules. It had been suggested that they had regard to the position on winding up. They were open to criticism from that point of view on two grounds; first that market values of assets would not be realistic in the winding up of a large insurer and, second, that assets differing materially in market value might need to be held depending on whether investments were in equities and properties on the one hand, or in fixed interest securities on the other. Moreover, the appropriateness of a winding-up concept might be questioned when Section 48(2) of the Insurance Companies Act 1974 required the liquidator to carry on the long-term business of an insurer unless the court otherwise ordered.

The philosophy of the regulations was a static as distinct from a dynamic philosophy in which the profitability of the insurer as a going concern would be taken into account, and the retention of profits was a painless way of putting right a deficiency. The example of investment in equity shares was relevant. If the expectation of the market were fulfilled, the insurer invested in equities of 80% greater market value than the insurer invested in fixed interest securities would earn more profits. Likewise an insurer with a large proportion of with-profit business at high premium rates would earn more profits than an insurer writing only non-profit business, but, assuming that the non-profit premiums were adequate, both would be required to hold the same minimum reserves under the rules. It was difficult to allow in rules for estimated future profits, but achieved profits over say the last five years would be some guide. He suggested either that the rules should be modified to take account of profitability as a going concern, or the decision as to the action to be taken if an insurer failed to satisfy the rules should take that into account.

The paper was welcomed as providing an opportunity for the discussion, and he agreed in general with its conclusions. It was rather less critical of the proposed rules at high rates of interest than he was because it did not discuss their effect when investments were in equities or properties. He had also criticized the rules for having no regard to the dynamic situation. No rules could fit every situation, and there was need for departures from the rules to be permitted when circumstances justified them. The best way of deciding on the departures was to suit them as closely as possible to the circumstances of each case having regard in particular to profitability as a going concern.

Mr J. O. Maynard (a visitor) recalled that Mr Redington referred to interpretation of the wind-up basis, but wind-up did not appear to be a realistic way of looking at the control process. If, on the other hand, life companies were not going to be wound up, a more convincing explanation of the regulatory test could be given. Its purpose was to compare two streams of future payments: the income stream arising from present investments, and the outgo stream arising from that portion of future payments which had accrued on present business in force. Those streams of payments were not, of course, the complete cash streams of the office which would include future premiums and full contractual payments. The test focussed attention on the value and timing of two partial streams and indicated when the comparison was a satisfactory one, that past operations would not place a burden on the office in the future. When the comparison was unsatisfactory, then some adjustment in the operations of the office would be required.

With the purpose and rationale of the test defined, and with assets and liabilities representing future streams of payments, it was understandable that the terms of the representation should change from time to time in accordance with market values. It was at market value that assets were at present being exchanged for cash, or for other assets, and that should bring realism to the test. However, situations might arise when market values—particularly equities and property—might be poorly defined or uncertain and when such values might not represent future income. Because of that, the regulatory body might wish to retain the authority to specify asset values and yields.

Appendix I, valuation rule (7) applied to contracts with guaranteed surrender or paid-up values. The rule included the sixth principle but permitted the actuary to deviate from it.
rule was important to offices which had policy provisions of the kind which were in general use in North America, and which included guaranteed cash and paid-up values. The policies in force in the U.K. in a number of Canadian offices were typical. In theory, those guaranteed values were at a level which brought to withdrawing policyholders the largest payments which did not increase the cost of insurance to continuing policyholders. The textbook method of calculating them was to work an asset share under the natural conditions pertaining at date of issue. The method usually allowed for amortization of initial expenses over a twenty-year period with the result that in relation to premiums, the guaranteed values were low in the early years of the policy, but increased noticeably in the middle and later years.

Those guaranteed benefits were regarded in the later years of a policy as extensions of the benefits guaranteed on death or maturity. If the insurance cover could be dropped, they served as a base for planning retirement, often by using annuity options rather than surrender for cash. In the early years the guaranteed benefits were regarded as emergency values. The policy was meant to give the holder a continuing flexibility of choice and the permanent sales forces were trained to emphasize that. The attitudes of those policyholders were quite different from policyholders of single-premium deferred annuities who sought to minimize taxes and maximize return on savings and who might give rise to wholesale surrenders when interest rates increased.

Should the sixth principle be applied to the type of insurance policy under discussion? Its application implied that the probability of withdrawal could rise to 100% and that that probability should be provided for each year. But that assumption was not borne out by reason or experience. To shed light on the matter, a study had been made of the cash flows of the Canadian offices during the stressful 1930s. The study showed that cash surrenders did increase, but the cash flows remained positive and no forced liquidation of assets was called for. Many years of experience with insurance policies having well designed guaranteed cash values lead to the expectation that avalanches of surrenders would not happen, and that the office could protect itself in those periods during which surrenders were above average.

The experience of financial institutions which accepted deposits, that is, banks and building societies, confirmed that point of view. Banks held true reserve assets and easily marketable assets at the traditional minimum of 30% of deposits. Building societies held liquid assets at 10% of deposits, and for stability dependend on the cash flow from mortgages which provided for continuous repayments of principal.

That reasoning led to the conclusion that in the context of a valuation dependent on market values applied to the type of insurance policy under discussion, the actuary might not wish to use the guaranteed value as minimum and might feel that negative values should not be excluded. He would be guided by many considerations including the composition of assets and their valuation, cash flow projections, the level of cash values, and the geographical diversification of business. He would almost certainly wish to introduce withdrawal decrements into his calculation at rates which were appropriate but not excessive.

Mr N. D. Freethy was concerned with the extent to which assets could be said to match the liabilities. Recent events had shown that mismatching could be a far more immediate cause of bankruptcy than any technically demonstrable insolvency. To pass judgment on whether a company should be allowed to continue in business solely because one figure was greater or less than another was wrong, and he questioned whether such a system would have prevented some recent disasters. Any rules for valuation of long-term business could not therefore be complete without a requirement as to the type and term of the assets permitted to match the liabilities, such requirement being more onerous for, say, a new office with only the minimum paid-up capital than for an established office with substantial free reserves.

If they were to be interpreted slavishly, the rules fell short because they were capable of ‘failing’ a company which was in fact financially viable, and vice versa. That was mainly because the net premium valued would vary, being a function of the valuation basis, so that the size of the expense allowance for the future was completely fortuitous.
The paper cast the net-premium method of valuation in the role of hero, and the gross-premium method as the villain. It was difficult to see that a net-premium valuation was anything other than a special form of gross-premium valuation where the margin for future expenses, contingencies, and bonus happened to be the difference between the functional net premium and the premium actually charged. In his view, the existing Schedule 4 regulations supported that by requiring the percentage difference between net and gross premiums valued to be expressly stated when a net premium valuation was carried out. Certainly the use of a net premium valuation was only meaningful when that margin between gross and net premiums valued was considered as part of the valuation basis. The drawback was that such a margin was not under the control of the actuary and might in some circumstances be completely unjustified.

The definition of the maximum rate of interest for valuing the liabilities in the proposed rules seemed totally unsuitable for a new or growing office. For one thing the interest yield on a tiny fund might fluctuate widely. With an established office the opportunity existed for a degree of immunization—however denigrated that concept might be in the paper—but with a new office, immunization was impossible and, in times of historically high interest rates a margin should be incorporated in the valuation basis for future reinvestment at possibly lower interest levels. That was suggested in § 5.4.2 and in the second proposed valuation rule the requirement to . . . take account of any foreseeable decrease in the yield on the fund during the term of the contracts in force. . . . was inserted as a lever to enable some control over such a situation. Such a requirement was fair, even if it were remarkably imprecise.

Any vagueness in the area of defining a suitable maximum valuation rate of interest was, however, compensated for by the undue explicitness of the maximum allowance for acquisition expenses of 3% of the sum assured. That again followed Skerman, except that he would like the maximum rate netted down for tax relief, and such a requirement would doubtless cause little trouble to a well-established office. Circumstances could arise, however, for a new office paying commission related to the premium on a contract carrying a low sum assured, where the limitation would cut in at a quite artificially low level and for no good reason would frustrate such an office’s legitimate attempt to accommodate new business strain. Some modification must surely be made to the definition of maximum zillmer to cope with such circumstances, and it was worth reflecting that the problem could be avoided altogether with the use of a gross premium valuation.

As an initial attempt to formulate a set of working rules for a minimum standard of valuing liabilities, the rules were a great deal better than many that could have been put forward. The important thing was that they should be used on a basis where the Department, in conjunction with the Government Actuary’s Department, could exercise some discretion. He sincerely hoped that they did not represent a minimum standard which would never be abandoned. Conversely, there were circumstances in which the allowance for future reinvestment at lower levels should be insisted upon by the authorities. Useful as the discussion was, the way in which the rules worked out in practice would provide far more useful information, and it was to be hoped that the rules would not set an inflexible minimum, and were open to modification in the light of further experience.

Mr E. A. Johnston said that two speakers mentioned the possibility that an office might find that it could invest its funds so that the regulations would allow it to use a weaker valuation basis, while another investment policy, which might perhaps be more in the interest of policyholders, would through the regulations require a stronger basis. There was the possibility here of a clash of interest for the actuary, which could not be completely eliminated whatever the content of the regulations, which could not be perfect whether they used $V_1$, $V_2$, $V_3$, or any other method.

The proposed regulations were not intended to take responsibility out of the actuary’s hands. In particular, the mere fact that a valuation satisfied the regulations did not necessarily mean that it was a suitable valuation for guiding the company, that it was the right valuation to
publish, or even that it indicated the right bonus rate to declare. The regulations were not designed for any of those purposes. However, problems of the type referred to could well occur, because the regulations did have to be satisfied. Mr Johnston agreed with Mr Barrow that although there was provision in the Act for modification in particular cases, directors of companies might well be reluctant to let it appear publicly that they were one of the particular cases, which led to the conclusion that it was important that actuaries should continue to regard policyholders' interest as their prime concern, and should not regard that duty as performed just because the regulations were satisfied. He hoped that development and research on the subject would continue with the intention of improving the valuation methods and other provisions of the regulations so as to reduce the areas where that sort of problem might occur.

Mr N. S. Graham said that in his view the proposed valuation rules, when coupled with the published regulations for valuation of assets, did not come near enough to the stated aim of consistency between the valuation of assets and liabilities. He believed that they would cause the Department to make unnecessary investigations and possibly to miss some companies where investigations ought to be made. He was concerned about two main aspects: the fact that the net premium method was not appropriate, and the method of calculating the rate of interest.

On the method of calculating the rate of interest, it was stated in § 5.4.4 that the proposed method penalized investment in low-yielding equities and property. That could have unfortunate repercussions on the stock market and it departed from the principle of freedom of investment. Also in § 5.5.6 the authors rightly pointed out that the yield should be that in force at the end of the year, but the position then was that the calculated interest rate could be substantially altered by switching investments just before the valuation date.

What were the alternatives? Experience in other countries had shown that an interest rate fixed by statute did not work. His suggestion was that the Department should determine the maximum interest rate at each valuation date, and that there should be determined not one but two rates of interest—that applicable to current investment conditions, and an assumed long-term rate. Each company would then use those two rates for the calculation of liabilities in accordance with the formula for $V_2$ that is, on the assumption of paid up immunization. That calculation was simple enough by computer, but if any company felt unable to do it, the Department could quote a weighted mean of the two rates of interest according to estimated proportions of existing assets and the value of future premiums. For a new office that would, of course, be near to the long-term rate.

Mr Graham suggested a bonus reserve valuation using the formula $V_2$, at rates of interest to be determined by the Department. If the unmodified net premium method were adopted, he still felt that the rate of interest should be determined each time by the Department, and that no policy should be valued at less than its current surrender value, whether guaranteed or not.

Any method of discounting was crude because it ignored the actual incidence of income and outgo. He therefore welcomed the reference to adequacy rather than solvency in § 1.4. If the requirements were not met by a particular company, he suggested that the Department should call for full emerging costs (using office premiums, not notional ones) to be followed by switching of assets where necessary. An examination of the net income or outgo in each year would then establish whether there was a pattern of interest rates which would render the company insolvent. Only if such a pattern were deemed by the Department to be possible should there be any question of the company being declared insolvent.

Mr F. R. Wales, in reply, organized his remarks so that he followed the structure of the paper, and brought in some of the remarks made at the Faculty meeting.

It had been emphasized by several speakers that the terms of reference rather restricted the scope of the paper; but Mr Barrow felt that the terms of reference were, nevertheless, realistic in the political circumstances of today. That point he accepted completely.

In § 2 the question of overseas control systems was considered, and Mr Leckie gave some interesting comments on control systems in North America, and some of the thinking behind
of the Liabilities of Long-term Insurance Business

the guaranteed surrender value system. It was interesting to note that the authors made the point that some overseas control systems could lead to undesirable distortions, and indeed many territories had already begun to change their practice as a result of the severe depreciation suffered at the end of the previous year. The North American system, as far as one knew, stood the test at that time.

Mr Shaw, when he introduced the paper in Edinburgh, referred to inconsistencies in the valuation of assets, inherent in a break-up valuation method, and Mr Skerman also drew attention to it with particular reference to the provisions of the Insurance Companies Act 1974 which provided for the continuation of a company as a going concern wherever possible. The authors fully supported that reference to inconsistency. Nevertheless, they accepted market values as a valid approach. Mr Brindley objected to them because of the resulting fluctuations in the total value of assets, but that overlooked the corresponding fluctuation in liability values arising from the automatic change to the rate of interest. Mr Skerman also mentioned that market values could be criticized, but he realized there was a link between bases of valuation which was more important than absolute values.

Turning to the valuation method, a correction was necessary to the paper. In § 5.1.3 there was a reference to Ammeter's comments regarding explicit solvency margins. The authors had attributed something to him that was not true. He had been quoted in the context of the gross premium valuation, and he was clearly writing in the context of net premium valuation. In his remarks, Mr Arthur was in effect referring to valuation on a premium basis and not valuation of gross premiums at rates of interest other than that assumed. Nevertheless, the authors felt that Ammeter's remarks were equally valid whatever basis the reserves were calculated on.

Mr Maynard gave an interesting exposition of the general reasoning underlying the use of the net premium system in conjunction with market value of assets. His approach appeared to look at it from a retrospective point of view, and there it was felt lay the justification of the net premium system. There was over concentration on it as a prospective valuation, and people generally levelled criticism at the net premium system on the grounds that it was not realistic. Mr Wales preferred to look at it as being retrospective, on the one hand determining the amount that should be kept in hand as reserve for the future, and on the other testing whether or not premiums being charged under current policies were adequate in terms of the valuation basis. The latter was the effect of the rule which stated that credit could not be taken for premiums higher than office premiums.

Mr Brindley objected to the high valuation rates of interest implicit in the statutory basis, but again the retrospective approach was relevant. Although a high valuation rate was assumed, which might presuppose that too optimistic a view of the interest which could be earned in the future was being taken, as the interest rate was increased, so the margin in the premium assumption was being increased, that is, the net premium value was being reduced.

Mr Brindley also referred to the value of a statement of asset income and liability outgo. The problem there was that it called for a qualitative consideration of the returns by the Department. What the Department was probably seeking was a series of fairly simple rules which enabled an initial scrutiny of returns to be made, and would then enable them to single out those offices which required extra scrutiny. There were in this country some 664 Fellows of the Institute employed in life offices, whereas there were 31 in government service. To expect them to expose every office return to the same degree of care with which the return was prepared was quite unrealistic. They should seek a method which would enable them to identify those offices which needed closer scrutiny.

Mr Smith queried § 5.1.2 where the authors referred to a standard of good conduct. Their authority for the assumption regarding good conduct was first Mr Skerman's paper (J.I.A., 92, 75) and, secondly, their knowledge of the negotiations that had taken place in Europe and the U.K., where it had been generally accepted that demonstration of mere solvency—and he used the word mere advisedly—was not enough. Mr Smith also claimed that the authors stated that they were defeated in their objective. The authors were defeated in finding a modification of the net premium system that enabled the value of assets and liabilities to move in
step. Nevertheless, the authors did not feel that they had failed in their objective. Their conclusion was that on the whole the unadjusted net premium method was satisfactory.

Mr Barrow was another who referred to the concern to be sure that the authorities viewed the new valuation standard as one of adequacy rather than solvency. He also made the point that mere solvency was not enough, and that in current conditions solvency valuation should be very rigorous. If the test failed and special dispensation was needed from the Department, there was clearly a risk that the auditors would qualify their certificate. Certainly the accountancy profession was very interested in the subject of actuarial valuations at the present time. Mr Barrow also referred to the need to scotch the asset stripper and hence not to capitalize bonus loadings.

Mr Arthur objected to the fact that the authors had not secured consistency between valuation of assets and valuation of liabilities, and emphasized that the comments in §§ 4 and 5 were not consistent. It would seem that he had misunderstood the point which the authors were trying to make. In § 4 the authors referred to consistency of method, whereas in § 5 they referred to consistency of result. He also claimed that the gross premium method was the only valid one, because the sum assured and the premium were known. But was the interest rate, which was assumed at valuation, known? It would be a bold person who would try and predict the rate of interest that would apply in the future. The point about the gross premium valuation method was that it was peculiarly sensitive to the assumption made with regard to future rates of interest. Mr Arthur also stated that the assumption of market value of assets presupposed a continuation of current market conditions or, at least, there was an implicit assumption that current market conditions would persist. That was not the authors’ intention.

Mr Redington in his usual explicit manner made it clear that a valuation both for solvency and emergence of surplus could not be achieved in the same calculations. Mr Benjamin also made the same point, and the authors wholeheartedly agreed. It was because of the fact that they had totally ignored the question of the equitable emergence of surplus in the paper.

Mr Skerman spoke on his reasons for the adoption of the net premium method and also put the question of policyholder expectations into perspective. Mr Wales did not accept the conclusion that net premium valuation was necessarily a good approximation to bonus reserve valuation. It only held for a conventional office with a large volume of with-profits business. It was not correct for a company with little or no with-profits business, or where with-profits policyholders were not entitled to share in non-profit surplus.

Mr Freethy took the view that the rules would determine whether or not a company could carry on business, that is, he ignored the adequacy concept. Mr Wales hoped that failure to meet the standard would not automatically mean that a company was compulsorily wound up. The comments in § 6 should make the authors’ view on this matter clear.

Mr Barrow and Mr Benjamin supported the $V_2$ approach in the paper. It was true to say that the authors instinctively liked that approach. Nevertheless, they did not feel that the result obtained from the calculations produced conclusive evidence in favour of its adoption. Furthermore, they had not investigated what happened if the limitation of the net premium applied.

Mr Brindley referred to the authors’ avoidance of specific matching in Tables (a) and (b) of Appendix 2. That was a deliberate action on the authors’ part, not because they were frightened to express a point of view, but there were so many different points of view as to what constituted a matching portfolio, that it was felt best to leave the reader to draw his own conclusions.

Mr Skerman referred to certain deficiencies in the net premium method which Mr Wales could not accept. In particular he appeared to be taking credit for future increases in equity income in his approach to immunization. In the paper the authors made it clear that they did not feel that credit should be taken for future increases as they were not known and were highly speculative. Therefore, it was felt that they should fall into surplus. In the authors’ view, equities should be treated as level interest irredeemable securities.

Turning to general considerations relating to the valuation rate of interest, Mr Leckie referred to the dangers of basing a valuation rate of interest on the in-force yield on the fund. He was
concerned with the possible fall in equity income and the danger of switching into sub-standard investments in order to enjoy a higher current yield. He assumed a debenture income to be guaranteed in absolute terms, whereas Mr Wales felt that was only a matter of degree, vis-à-vis equities. Mr Leckie also ignored the responsibility of the actuary to take account of substandard investments in deciding upon the possibility of current yields being maintained.

Mr Arthur assumed that the valuation basis immunized the business, but surely it was the selection of investments that performed the function of immunization? He also claimed that the authors had attributed Mr Redington's comments about realism to the negotiations in Europe. The authors did in fact use Mr Redington's quotation in the broadest possible sense of the word realism, and Mr Wales felt sure that Mr Redington would accept that.

Mr Skerman referred to proposals by the Department that the actuary should make allowance for a possible future decrease in the yield of the fund. It was interesting to compare the results as shown in the Appendix using the formula $V_2$, where $g$ was the full yield on the fund at present, and $i$ was an appreciably lower long-term rate of interest, and compare that with the normal unadjusted net premium reserve using 10% adjustment. The results in fact were surprisingly similar for a broadly based portfolio of business.

Mr Freethy felt that the interest provisions were unsuitable for a new office. It should be borne in mind that the rules which were being put forward were in the form of a long-stop, and were not a substitute for the actuary's judgment.

Mr Johnston and Mr Leckie referred to the possible switching of investments to push up the yield on the fund. If an office indulged in window-dressing to do that, the proposed quarterly returns would expose it.

Mr Graham thought that the proposed rules would penalize investment in equities and property. He claimed that a fixed rate of interest as used overseas did not work, and drew the inference that the same thing would apply in the U.K. It was important to bear in mind that the proposals were not for a fixed rate of interest. It was a proposal for a rule to determine the rate of interest. Also his objection to penalizing investment in equities and property did not hold good in Mr Wales' view. Indeed, he said that he had been brought up to believe that investment in equities and property was speculative, and nothing that had happened in the last few months had led him to change his view!

Mr Graham also wanted a bonus reserve valuation method using a $V_2$ approach, with the Department specifying $g$ and $i$. He ignored the question of bonus rates. It was difficult to believe that the Department would try and specify a standard rate of bonus to be used by all companies for bonus reserve valuation. Also a limitation of the reserve to the surrender value would bring him back to the net premium basis as most offices used the net premium method for calculating surrender values.

Dealing with the proposals relating to the 3% zillmer, although Mr Brindley accepted the Department's proposals, Mr Freethy objected because from the point of view of a new office struggling to get established, it could prove rather expensive if acquisition costs exceeded 3%. Mr Wales' view was that if a new office encountered excessive costs in getting established, that should be financed by the shareholders and not at the expense of the security of policyholders.

Mr Brindley referred to the authors' fears of runaway inflation, and pointed out that the first result would be wholesale surrender or lapse of business. That was a fair comment.

Turning next to guaranteed discontinuance values, Mr Maynard put forward an interesting case for not reserving 100%, guaranteed surrender values in all cases. The authors had discussed that matter at considerable length, but did not come to any firm conclusion. Speaking personally, Mr Wales said he had considerable sympathy for Mr Maynard's point of view, and his own experience with an office with a broadly based portfolio of business, largely obtained by direct sales, was that such business was remarkably insensitive to economic conditions. Mr Leckie also made the same point about guaranteed surrender values and called for the use of withdrawal rates in valuation.

Mr Brindley gave examples of various valuations, and claimed that it indicated that under the net premium valuation bonus expectations were not protected. Bonuses were not guaranteed
and were meant to represent emerging profit. It was difficult to see how one could reserve for emerging profit as it then ceased to be profit.

Mr Barrow hoped that the regulations would be accepted as an interim measure and that work would proceed on producing something better. Mr Wales supported that plea, there was much more work to be done.

Mr Benjamin called for a series of 'Generally Accepted Actuarial Principles'. They included provision for a maximum i, reserves not less than guaranteed surrender values on a policy-by-policy basis, a defined margin for expenses and a statement concerning the matching situation. If the office were mismatched the valuation of assets would include suitable margins to cover the potential losses arising from switching to a matched position.

Mr Johnston made the point that actuaries should continue to consider policyholders' interests as their prime concern rather than the necessity to meet the precise requirements of the regulations. Mr Wales thoroughly supported that view, which was a good point on which to close.

The President (Mr G. V. Bayley), in proposing a vote of thanks to the Working Party, said that the discussion had been lively, and he particularly wished to thank the Canadian guests for their contributions.

The Institute now had the benefit of two discussions—one in Edinburgh and one in London. At least the Council was in a position to know the variety of views which members had expressed when it made further representations to the Department. There had, of course, been many criticisms of the attempt to define rules embracing the net premium valuation system. However, as far as he knew, no alternative set of rules embracing an acceptable alternative had been advanced which commanded a wider measure of support. At least perhaps it could be generally agreed that no set of rules could be designed which would meet all situations found in practice.

In the U.K. those concerned benefited greatly from their freedom to operate long-term insurance business. The price to be paid for continuing the freedom enjoyed was a system of minimum limitations which must be generally applied and accepted, with the escape route of Section 57 for special circumstances. The profession could help additionally by setting its own standards to support the statutory regulations. Together they must pass the test to prevent the failure of long-term business, and there had been opportunities recently to test extreme conditions.

The President said that brought him to the working party and to the extreme conditions in which they operated. They responded with extraordinary speed and enthusiasm to Council's request, and it must have been one of the quickest produced papers on record. What was more, they had to commute between Edinburgh, Glasgow, London and Aylesbury and to communicate in two languages! The Institute was very grateful to them for their hard work, and especially grateful to Mr Wales not only as 'whipper-in', but for closing and replying to the discussion. The record attendance at the meeting demonstrated members' interest in the paper, and the President invited members to show their appreciation with the same enthusiasm displayed by the working party itself.

WRITTEN CONTRIBUTIONS

Mr K. H. Allen: Valuation methods and bases have of course to be considered in relation to the purpose for which the valuation is being made. Regulations for the valuation of liabilities made under Section 78 of Insurance Companies' Act 1974 may, by sub-section 3, make different provision in relation to different cases or circumstances, but Consultative Note No. 10 appears to indicate that the one set of rules set out in Appendix I is intended to apply wherever sections of the Act refer to applicable valuation regulations.

The proposed rules lay down a minimum value for the liability under a contract, and this liability is to be calculated by the net premium method. In § 5.1.2 the authors explain what is perhaps the most important function of the minimum basis, that is, to establish what they call
a standard of good conduct. The Department are clearly looking for an early-warning system so that the Secretary of State may consider intervening before damage is done.

Since the Act was passed a new factor has entered the situation in that the Government has proposed that some kind of a guarantee should be given by life offices to the policyholders of those companies which cannot meet their commitments. This concept adds a new and important dimension to the valuation regulations. The inequity of the cost of such a guarantee falling on the with-profit policyholders of an office which distributes, say, 90%, or more of profits by way of bonus is obvious. In order to protect those policyholders it is imperative that the early-warning system should be free from uncertainty, and stronger than a mere test of solvency to which margins against random fluctuations have been added. The net premium method contains a discipline which is absent from a gross premium valuation. The latter is sensitive to variations in the basis so that the results can easily be modified if the answer is inconvenient. In my opinion any attempt to modify the regulations away from the net premium method should be strenuously resisted. Only thus can the Department be encouraged to intervene, formally or informally, at a sufficiently early stage when a company is showing a trend in the wrong direction, and thereby establish the necessary degree of market responsibility.

Mr D. G. R. Ferguson: Several speakers referred to the purpose of the valuation basis and whether it was to demonstrate adequacy or solvency, but what do these words mean in practice? A trading company can be declared legally insolvent when it is unable to meet its debts. At what point is a life assurance company insolvent by this legal definition? No-one but an actuary is competent to give an opinion but even he is unlikely to answer categorically one way or the other and might instead say ‘it is more probable than not that the company is unable to meet its debts’ or ‘on the weakest valuation basis I am prepared to use, liabilities exceed assets’. These are probability statements based on several assumptions. What is certain is that both the actuary and the regulatory authorities have an obligation to policyholders to take remedial action at points along this ‘probability of solvency’ scale. The key point seems to me to be the point at which the company must be forced to operate as a closed fund. Action with which we are all familiar as part of normal managerial control will take place before this point, and if a closed fund is not enough then benefits may subsequently have to be reduced or a full insolvent liquidation undertaken, but cessation of new business and the economies that that implies is the key point. Speaking from bitter experience, there must be an intermediate stage before a full insolvent liquidation is undertaken as this is a disastrous and very costly business for the policyholders one is trying to protect. I understand that in America the intermediate stage is the appointment of a Rehabilitation Manager who runs the company as a closed fund and that this procedure works very satisfactorily.

If, as I am suggesting, the objective of the valuation basis under discussion in the paper is the determination of the point at which a closed fund should be enforced, and if furthermore that point is defined, for example, as the point at which, ignoring any explicit solvency margin, it is equally likely the Company will or will not, if operated as a closed fund, be able to meet the future debts under existing contracts and the future expenses to be incurred in fulfilling those obligations, then two conditions, as several previous speakers have said, are essential.

1. The valuation basis must be a realistic prospective basis.
2. Maximum regard must be paid to the degree of matching of assets and liabilities.

Mr Wales condemned the net premium method in his closing remarks by saying that he always saw it as a retrospective rather than prospective method and I agree with the majority of speakers and especially Mr Barrow and Mr Benjamin that what is required is regulations which provide for a gross premium method of valuation and that sufficient flexibility be allowed so that the basis can be more or less stringent depending on the degree of closed fund matching.

Mr G. T. Pepper: Under the Department's proposals the rate of interest for calculating the present value of the liabilities of a life assurance fund (the valuation rate of interest) depends on
the actual income of the fund during the year immediately preceding the valuation date. If the income of the fund can be raised, the valuation rate of interest can be increased. An increase in the valuation rate of interest reduces the present value of the liabilities and, therefore, increases the margin of solvency.

The income of the fund can be increased by the following investment transactions:

(a) Switching from gilt-edged and other risk-free stocks into poor-quality and high-risk loan stocks.
(b) Switching from highly marketable stocks into unmarketable stocks.
(c) Investing very short, when the yield curve is falling with term because rates of interest are expected to fall.
(d) Investing very long, when the yield curve is rising steeply with term because rates of interest are expected to rise.
(e) Purchasing cum-dividend gilt-edged stocks and selling ex-dividend stocks.
(f) Switching from good-quality equities into poor-quality ordinary shares where the risk of bankruptcy is significant or where prospects are poorer.
(g) Switching from good-quality equities into ordinary shares in companies which have a high proportion of wasting assets.

In all the above cases there is an increase in the margin of solvency under the proposed regulation. This is wrong for the following reasons:

(a) A loss to the fund is made more likely rather than less likely. The rules to detect present insolvency can cause future insolvency.
(b) Such investments are against the long-term interests of the policyholders.
(c) The resulting distortions to the pattern of investment in the Stock Exchange will cause distortion to the type of finance available for industry.

The proposed regulation is obviously wrong and the authorities should think again. The valuation rate of interest should not be based on the actual income of the fund but on the yields of suitable indices, applied to the market values of the different types of investments.

Mr J. K. Scholey: I have several points of criticism. The first is the too ready acceptance of the net premium method and the values it provides. Figures in the Tables show that a life office can be regarded as insolvent for the sole reason that the rate of interest secured on new investments is higher than had been expected. It is a misleading method and cannot be a proper guide in much-changed circumstances. There is an illuminating comment in § 2.5.2 where the authors say, 'There is no doubt that throughout the world many offices may have great difficulty in demonstrating an adequate solvency margin on the basis currently laid down by the authorities.' Where is the fault— with the offices or in the solvency basis—we only need to pose the question to see where the fault must lie.

The authors in § 5.3.6 make the comment that for a mixed portfolio, the strains and releases of a net premium method may well roughly cancel out. This isn't what I have found. Taking the example of an office which has been careful with its investments and which has a mixed business of endowments in force ranging from 15 to 30 years original term and a portfolio of investments related to the maturity dates, I found that if you change the valuation rate of interest from 3% to 6% the value of the net premium reserve dropped by 18% but the value of investments fell by 24%, using the ratios quoted in Appendix 2. There is no cancelling-out here of strains and releases.

The authors consider three other methods. No. 4 warrants little consideration. No. 3 is dismissed with the phrase 'it will be seen immediately that in all cases the reserves are far too weak'. This is quite unproven in the paper. I assume it is based on the fact that for endowment assurances the ratios of $V_3$ are lower than the asset ratios of matched investments. But if higher interest rates are a benefit to an office, oughtn't the valuation basis to show this—and this is what $V_3$ does.
The rationale of \( V_3 \) is well enough known. The authors in § 5.2.4 have, I think confused the issue and got the wrong answer by using \( g \) in the numerator when it should be \( i \) and they have used \( i \) in the denominator when it should be the basic net premium interest rate. There is of course the problem of deciding on the correct value for \( i \) but it isn't such a big problem as deciding on the valuation rate for the net premium method set out in the draft regulations. Contracts must be considered in two parts—the accrued and the future, if you are going to get any reasonably scientific method of valuation. This is one reason why the authors' method \( V_2 \) is not likely to prove satisfactory; their formula \( V_2 \) is wrong—because they have taken credit for a net premium related to current and prospective interest rates instead of the normal net premium.

Actuaries will have to look separately at accrued benefits and future benefits when valuing your pension business; this hasn't been mentioned so far and the regulations do not refer to it at all. I imagine the reason is that a net premium method of valuation has little relevance to pension business.

The authors state in § 6.1 that it is impossible to frame a valuation method under which liabilities change correspondingly in value to a change in immunized assets. But this is only saying that it is theoretically impossible to have a batch of assets which, at all levels of market rates of interest, will equally match outgo on claims. My comment is that the valuation result ought to reflect changed conditions. If interest rates change—this ought to be reflected in a change in the valuation result. To show this correctly is the hallmark of a sound method. \( V_3 \) corrected in the manner I have indicated is, in my view, such a method.