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SOME THOUGHTS ON SOLVENCY OF LIFE ASSURANCE COMPANIES

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1. INTRODUCTION

1.1. Actuaries engaged in the life assurance business have always been concerned in maintaining the solvency of their own office. They have also had an indirect interest in the solvency of other life offices, because an insolvency raises public doubts about the security of life policies generally, with repercussions on the whole industry and the actuarial profession in particular. The Policyholders Protection Act 1975 has extended the interest in insolvency of other life offices to a financial involvement. This was a direct consequence of the failure of several life companies, due to turbulent financial conditions following a period conducive to the setting up of new companies with a venturesome approach to the business. The subject is therefore highly topical and, whilst it has been widely discussed in recent years, many problems remain.

1.2. A company is deemed insolvent where it is unable to meet its liabilities. For long-term business this is a matter of judgement, so that the main questions to be answered are :

(*a*) When does a company become insolvent ? — Recognition
(*b*) How can this be prevented ? — Prevention
(*c*) What action is required after the event ? — Cure

This paper is mainly concerned with the second question, although it is realised that an answer must first be obtained to the first question.

1.3. The paper is divided into the following parts :

2. Insurance Companies Act 1974
3. Policyholders Protection Act 1975
4. The role of the Appointed Actuary
5. Causes of Insolvency

2. INSURANCE COMPANIES ACT 1974

2.1. Appendix I summarises the provisions of the Insurance Companies Act 1974 which are relevant to the solvency of Life Assurance Companies. This Act gives the Secretary of State very wide powers of control, and some of these are discussed in the following paragraphs.

2.2. The minimum paid-up share capital was raised to £100,000 by the Companies Act 1967. It is woefully inadequate. On the assumption that capital and free reserves must be large enough to cover overhead expenses and new business strains likely to arise in the early years of a planned expansion programme, we would suggest a minimum paid-up share capital of £1 million. The question of amount of capital is explored more fully in Section 6.

When solvency is in question, the shareholders must be prepared to lose all their capital. Hence, for judging solvency, the liability to shareholders should be used to enhance the value of the Life Fund. The minimum solvency figure on this basis is £50,000. This also is too low a figure, but its proper value depends upon the valuation regulations yet to be promulgated.

2.3. By S.7 of the Act, a company will not be authorised to transact insurance business if the Secretary of State deems any director, controller or manager not to be a " fit and proper person " for that purpose. This is an important safeguard, but because it is operated in secret its effectiveness is difficult to judge, and it seems to us wrong that no reason need be given and that there is no right of appeal.

The special position of the Appointed Actuary is considered at some length in Section 4.

2.4. For the purpose of determining solvency, regulations under the Act lay down bases to be used for valuation of both assets and liabilities, the latter being in draft form at the time of writing this paper. Both the Faculty and the Institute of Actuaries have accepted the need for statutory standards of valuation and by consultation with the Department of Trade have undoubtedly contributed to improved regulations. A full discussion of this subject is outside the scope of this paper, but we would like to make some remarks of a general nature.

2.5. The statutory valuation standards are based on:

(*a*) Market value of assets.
(*b*) Net premium valuation of conventional policies, with a Zillmer adjustment.
(*c*) A valuation method of similar strength for non-conventional policies.

Following world-wide precedent and the " six principles " discussed within the E.E.C. there can be little surprise at the approach taken. Objectivity is given pride of place, as we think it must be in any " standard ", and the recent history of life offices in difficulty must almost automatically preclude free rein for actuarial judgement.

2.6. There is some doubt as to whether market value of assets has any meaning so far as long-term business is concerned. No life office in recent history has realised all its assets and distributed them and if such an occasion should ever arise, it is most unlikely that the value of the assets at the date of distribution will equal the value at the date of insolvency. Insolvency and subsequent indemnity, assistance or protection is in every case in practice based on the concept of a continuing office. However, it is difficult to determine any other asset valuation basis which could apply to every company.

More objectionable is the direct matching of market values of assets against liabilities valued on a net premium method. If an actuarial student were to recommend this approach in an examination paper we seriously doubt whether he would pass. Indeed, the Faculty has expressed its view in no uncertain terms, after detailed investigations, that a life office which satisfies the regulations may be insolvent and that one which does not satisfy them may be solvent. This very uncertainty must create problems when determining a valuation basis of " similar strength " for non-conventional policies.

2.7. It is helpful to study the rationale of the market values/net premium valuation approach and it would seem to be based on the following logic. If one assumes that one can invest today and at all times in the future at a fixed rate of interest, say 8%, then actuarial caution would suggest that premiums be based on a lower rate, say 7%. If all the investments are in government securities matched to the term of the liabilities, a conservative valuation basis would be a net premium one, also at 7%. In these circumstances the life office would always be solvent and profits would emerge annually as earned. However, it will be appreciated that in such hypothetical circumstances (unchanged premium rates over a long period) exactly the same results would be obtained by a gross premium valuation.

2.8. The situation becomes much less clear-cut in times of changing economic and interest rate conditions and the results of a working party on the subject, presented by Messrs Bews *et al*, in the paper to the Faculty entitled " Proposals for the Statutory Basis of Valuation of the Liabilities of Long-Term Insurance Business ", did not show any firm conclusions. Solvency of long-term business cannot be established by comparing a single discounted value of liabilities with a single discounted value of assets. Nor is adjustment of the rate of interest in a net premium valuation sufficient to allow for mismatching. The only satisfactory method is examination of emerging costs (see para. 5.4).

2.9. If this reasoning is accepted the main result of the solvency regulations is to enable life offices to be arranged in order of probable solvency so that a priority order is available of offices requiring deeper investigation. In this situation, the relative accuracy of the statutory solvency basis is less important, and experience will show up any inconsistencies in the approach.

2.10. We would like to make two further observations on this subject. Firstly, one can only depart with safety from an exactly matched portfolio of gilt-edged securities to the extent to which one holds free reserves. Secondly, the regulations rely on implicit margins even though these cannot be quantified.

2.11. The phrase " reasonable expectations of policyholders " occurs twice in the Act and its intepretation has been the cause of some controversy. Sections 28 (*a*) and 37 give the Secretary of State, if he considers that such expectations may not be met, power to intervene and force the company to take appropriate action. It is not clear whether the phrase " reasonable expectations " is to be read as meaning for life business what liabilities means for general insurance or whether the words are used to imply something more than guaranteed benefits, i.e. bonuses. In fact the complete phrase is " reasonable expectations of policyholders or potential policyholders " and so may require us to look at the problem through the eyes of someone on the point of signing a proposal with a quotation in front of him — an occasion when estimates based upon current bonus rates, however qualified, may be regarded as reasonable expectations. However, these expectations are likely to reduce in adverse financial conditions, particularly if a company is in difficulties, and so we do not consider that the phrase implies permanent maintenance of the current bonus rate.

3. POLICYHOLDERS PROTECTION ACT 1975

3.1. The preamble to this Act states that its purpose is: " . . . to make provision for indemnifying (in whole or in part) or otherwise assisting or protecting policyholders and others who have been or may be prejudiced in consequence of the inability of authorised insurance companies . . . to meet their liabilities . . . and for imposing levies on the insurance industry for the purpose . . . ".

Action under the Act arises in three distinct circumstances:

(*a*) Winding-up, voluntarily or by court order.
(*b*) Provisional liquidation, following appointment of a liquidator.
(*c*) Financial difficulties, defined in terms of " bankruptcy ".

3.2. In each case, it seems likely that the critical point will be reached as a result of a Department of Trade investigation, following a failure to meet the statutory valuation standards. If these standards are adequate, the situation will be recognised as soon as security for benefits drops below 100%. However, the Act only provides a guarantee of 90% of benefits and one might conclude that assistance under the Act will never arise.

Unfortunately, this is not so because of the time delay in producing results. Normally, an actuarial certificate is only provided once a year and the returns to the Department of Trade are not due for a further six months. A lot can happen in eighteen months—in particular, a company can expand very rapidly by the issue of highly competitive contracts of dubious profitability. We return to this theme in Section 4.

3.3. The Act provides for the ignoring of all bonus rights which have not already vested, and this is confirmation of the well-established actuarial concept that with-profit policies provide a " cushion " against adverse experience; the higher the proportion of with-profits business held by a company then the lower is the likelihood of its policyholders ever needing assistance under the Act. However, the ignoring of future bonuses will make no difference to the liability on a net premium valuation basis and this could be used as an argument in favour of a gross premium basis for statutory purposes.

3.4. Section 12 of the Act gives the Policyholders Protection Board power to reduce benefits to less than 90% if, in the opinion of an independent actuary, those benefits are " excessive ", in other words if the premiums were grossly inadequate.

In retrospect, premiums *have* proved inadequate, otherwise the

company would not be insolvent. One can only infer therefore that the judgement should be applied at the date of commencement of each policy, using as a guide the premiums quoted by other companies for similar contracts at that time. This is a difficult problem for the independent actuary, and the first " test case " will throw considerable light on the interpretation of this section of the Act.

3.5. The maximum liability in any one year of companies to contribute to the Fund set up under the Act is set at 1% of premiums due under policies effected after 31st December 1974, and this raises two questions of principle :

(*a*) What happens if this sum is insufficient ? The guarantees are absolute, and presumably the balance can only come from the Exchequer.

(*b*) Should the contingent liability for this levy be brought into account in the valuation of liabilities ? It is not mentioned in the statutory regulations and one can only conclude that it is assumed to be included in the implicit margins.

3.6. In our view, the likely financial commitment of companies in the form of a levy is very small. More important is the matter of principle that soundly managed companies will be called upon to support the policyholders of competitors in difficulties. This is an encouragement to irresponsible management and intermediaries to offer favourable contracts with the backing of the Act.

Another cause for concern is that the Act does nothing to reduce the period of uncertainty for policyholders in financial difficulties—indeed, it is likely to have the opposite effect. This delay has been a strong source of criticism in recent years.

4. THE ROLE OF THE APPOINTED ACTUARY

4.1. The 1974 Act requires an insurance company authorised to transact long-term business to appoint an actuary ; also to advise the Secretary of State of his name and the date of commencement and termination of the appointment.

The Appointed Actuary has the responsibility of carrying out actuarial investigations and signing statements as prescribed in regulations, which are still in draft form at the time of writing.

4.2. It has been proposed that there should be an annual certificate covering two points :

(*a*) Solvency in accordance with the valuation regulations.

(*b*) Confirmation that the nature and term of the assets are appropriate to meet the liabilities.

4.3. It has also been proposed that there should be a quarterly return stating that if an actuarial investigation were to be carried out, then the actuary is of the opinion that (*a*) and (*b*) would be satisfied. Also, directors would sign a quarterly statement confirming that premium rates and surrender values have been approved by the actuary during the previous quarter.

4.4. In May 1975 the Faculty and Institute jointly published a guide to actuaries appointed under the 1974 Act. This goes a lot further than the draft regulations and we should like to mention three points arising out of the guide.

(1) Although remunerated by the company, the Appointed Actuary has an obligation to inform the Department of Trade if the company takes any action which seems likely to lead to the withholding of a subsequent actuary's certificate. This leads to a direct conflict of interests, on matters which are a question of judgement rather than fact.

(2) The guide emphasises that this is a *continuous* obligation, not solely at the time of signing certificates. This can be very onerous, for example in the case of a small company employing a consulting actuary.

(3) There is reference to the effect of marketing plans upon the financial position of the company. Since premium rates are already covered, this presumably refers to the amount of new business strain in relation to the free estate. This point is discussed at some length in Section 6.

4.5. The Department of Trade have always laid stress on the importance of the Appointed Actuary in the control of a life company. Unless the actuary, through lack of technical expertise, experience or integrity, fails to carry out his proper professional responsibilities his certificates form a very real safeguard. However, we believe that the continuous monitoring should be a statutory requirement rather than part of the professional guide.

This could be done as part of the annual certificate ; the actuary would undertake to inform the Department of Trade if at any time during the following eighteen months (to cover delay in making returns) in his opinion the conditions in 4.2 may not be met. Similar remarks apply to the directors' certificate, so that quarterly returns would be avoided altogether.

5. CAUSES OF INSOLVENCY

5.1. We should like to examine this problem under six headings :

(*a*) Premium rates.
(*b*) Matching of assets with liabilities.
(*c*) Investment policy.
(*d*) Guaranteed surrender values.
(*e*) Expenses.
(*f*) Mortality.

Premium Rates

5.2. As already mentioned, the premium rates of all insolvent companies are proved inadequate in retrospect, but we are concerned here that they are adequate at the time of issue of each policy. This is a matter of judgement, for the particular circumstances of the company must be taken into account. The required approval of the actuary therefore seems the only safeguard, but he must be fully aware of the dangers of pressure to quote highly competitive premiums from an aggressive marketing manager when a company is trying to expand.

In the remainder of this section, we assume that premium rates have always appeared adequate when the policies were issued.

Matching of Assets with Liabilities

5.3. The theory of matching is quite straightforward, though the arithmetic is very tedious and best done by computer. Having calculated the total net outgo (claims less premiums) from all existing policies in each future year, then one should choose investments such that the receipts in each year from income and redemption, net of tax, equal the above amounts. Unfortunately, this cannot be exactly followed in practice because :

(*a*) Fixed interest investments of suitable term may not be available.
(*b*) Even ignoring future new business (which should be self-supporting) the fund may grow in future, and investments will have to be made upon terms unknown at present.
(*c*) Some policies include options to take benefits at alternative dates, and many fixed interest investments have alternative redemption dates.
(*d*) The economy requires some investment in equity stocks, which are uncertain as to both income and value when they are realised.

(*e*) By departing from the matched position, a company can improve its bonus earning power—although this is of secondary importance to security and will depend upon the amount of free estate.

5.4. The Appointed Actuary is required to state in his annual certificate that the matching position is satisfactory (para. 4.2). If the Department of Trade felt that an investigation into the solvency position were necessary, it would no doubt call for a full analysis of emerging costs. If serious mismatching were found, the company should be required to change some of the investments, until reasonable matching is obtained. It is then possible to examine what patterns of interest rates in the future could render the company insolvent. If one of such patterns is deemed even remotely possible then the company would be declared insolvent.

This process is laborious and expensive, so underlining the importance of an initial solvency criterion which places companies in approximately the correct " order of demerit ".

Investment Policy

5.5. Statutory restriction on investment policy of long-term insurance companies is fairly common in other countries, but is not favoured in the U.K. because it restricts the ability of companies to compete with one another and prevents them from acting in what they consider to be the best interests of their policyholders. The new asset regulations exert a reasonable measure of control in this area.

Guaranteed Surrender Values

5.6. Under the matching theory described above, surrenders are ignored on the grounds that the surrender value is simply the value of the matching investments less a margin for profit. This implies a prospective method of calculation and ensures that the amount paid is fair in relation to other policyholders. In practice, the basis would not be continuously altered but would reflect average investment conditions over a period.

5.7. On the other hand, if surrender values are guaranteed, they may well at times exceed the amount calculated on the above basis. In effect, the date of payment of the benefits is no longer fixed and it becomes impossible to find suitable matching investments. The theoretical answer is to assume a probability of surrender in each year of a policy and match accordingly, but this is unsound because the proportion surrendered is likely to increase when stock market

prices are low, causing danger of insolvency, which causes a further increase in surrenders and ultimately actual insolvency.

5.8. A good example was the crisis for single premium Income Bonds caused by the slump of 1973. They tended to be taken out by sophisticated investors, who took advantage of the guaranteed cash values. These were usually equal to 90% or 95% of the premium paid, an amount which appeared perfectly safe when the policies were taken out. Apart from the companies rendered insolvent, many others must have regretted the effect on their surplus.

5.9. Similar dangers appear to be inherent in flexible endowment policies, which are becoming very popular nowadays. These policies usually offer maturity expectations based on the continuation of a certain system and rate of bonus. In addition, they offer guaranteed surrender values, usually every year after the first ten years, which require different investments for matching. It may be possible to overcome these objections by a separate internal fund and bonus system for this particular class of policy.

5.10. Guaranteed surrender values are the most important instance of financial options. Others are annuity options on endowment assurances, guaranteed deferred annuities under deposit administration pension schemes, and maturity guarantees under unit-linked policies. All involve alternative benefits which cannot be matched by single investments.

For the single liability figure in the statutory valuation requirements, it is possible to use the highest value of the alternative benefits. It is much more difficult to sign the actuary's certificate regarding suitability of assets, and there are two approaches to consider:

(1) It may be possible to devise a more complex investment strategy. For example, for flexible endowments one investment could match the guaranteed value after ten years, and thereafter be treated as cash on deposit at a conservative interest rate, with a consequent effect on the guaranteed values after ten years.

(2) In addition to an investment matching the most likely option, other investments may be chosen so that on the most conservative assumptions they will combine to meet other options. Effectively, this means investing part of the free reserves for a specific purpose with an adverse effect upon surplus.

If the actuary is not satisfied that the problem can be dealt with by either of these methods (or a combination) he should not give his approval to the policies.

Expenses

5.11. A life office must incur certain overhead expenses of management irrespective of the amount of business. Therefore a small company is not viable, and we have already mentioned (para. 2.2) that the statutory minima of paid-up capital and solvency margin should be increased.

High initial expenses (commission and procuration costs) should be allowed for in the premium rates, but may take many years to recover. The resulting new business strain constitutes a serious risk for a company which is expanding very rapidly. This aspect is so important that we consider it at length in Section 6.

5.12. Maintenance costs in future could become very high because of inflation and we doubt whether sufficient allowance is made in the premium rates by most actuaries. For conventional business the shortfall may well be made up from interest surplus, but for unit-linked business the long-term threat is very real.

The draft valuation regulations refer to an allowance for expenses " likely to be incurred in future ", and so place an obligation on the actuary to allow for future inflation.

Mortality

5.13. Most life companies have adequate reassurance facilities, so that the only danger posed by a few large claims is that the reassurers are unable to pay. For this reason, we suggest that the reassured liabilities should only be deducted from the gross figures if the reassurance company is subject to regulations which are similar to those applying to the ceding company.

5.14. In recent years there has been little improvement in mortality at older ages, but if this should be brought about by advancements in medical science, it could cause problems for offices with a high proportion of annuities and pensions business. Allowance should be made for this in the valuation basis.

6. THE CAPITAL BASE

6.1. In view of the uncertainties outlined in the previous section, and the dangers inherent in rapid expansion of business between valuation

dates, we believe that there should be a continuous method of advance warning where a company is getting into difficulties, rather like the " solvency margin " for general insurance business. Such a method is developed in this section, and we would emphasise that it is applicable in the context of a going concern (not an insolvent situation).

6.2. Up till now the government has actively encouraged new life offices to start business, and existing companies to expand, on the basis that competition is in the consumer's interests and that freedom with publicity will ensure fair play. These may have been reasonable assumptions in a capitalist society where healthy competition was encouraged and the weakest went to the wall. The Policyholders Protection Act changes the whole picture by reducing the penalty, so that fresh thinking is required. In addition, the difficulties of some life offices in recent years cast some doubt on the effectiveness of the control system. It is, in our view, appropriate to re-examine from first principles the bases upon which life offices should be set up and permitted to transact life business.

6.3. In our present society, still essentially a capitalist one, the solvency of any trading company depends on its capital base which consists of (i) its issued share capital and (ii) its free reserves. It is also accepted practice that if a trading company seeks long-term finance by the issue of debentures the amount of such debentures will be limited to a small multiple of its capital base. If we now consider a life assurance business in normally accepted business terms, the first step is to seek a method of determining its value.

6.4. The Department of Trade has up to now declined to provide in the asset regulations for the value of a life business which is part of a composite insurance group, so that no officially acceptable basis exists, although it would be open to a company to apply under S.57 of the Insurance Companies Act 1974 for a value to be brought into account.

6.5. In practice such a life business must have a value, positive or negative, and the problem becomes one of definition. There are at least four possibilities, as follows :

(*a*) The stock market valuation of a proprietary company. Unfortunately this cannot be applied to the many companies that are mutual, subsidiaries or privately owned.

(*b*) The amount that would reasonably be paid by way of consideration for an immediate transfer or assignment. This value

would depend to a considerable extent on the particular purchaser and as we are dealing with a hypothetical event this approach is not practicable, although that need not prevent an individual approach under S.57 on this basis.

(*c*) Another approach is to obtain from an independent actuary an estimate of future stockholders' profits on a conservative basis. This introduces a significant degree of actuarial judgement although it might be possible to define the bases to be adopted on the lines taken in the regulations governing the valuation of liabilities.

(*d*) This is expressed in Article 18 (3) (*b*) of the E.E.C. Draft Life Directive, which would value a life business on the basis of 50% of the average profits of the last five years multiplied by a factor which seems to represent the average outstanding duration of the contracts, discounted at current interest rates; the 50% multiplier is designed to allow for over-generous past profit distributions.

6.6. In our view the E.E.C. approach offers a foundation on which a practical and objective valuation may be built. We have to bear in mind, however, that we are primarily seeking to establish a capital base of an ongoing office and not a valuation on a solvency basis. In this context, the 50% multiplier would not seem to be appropriate and instead a figure much nearer 100% would be justified; also in the context of an ongoing office the factor could well be higher than if one considered a closed fund. At a time of high interest rates like the present a combined multiplier/factor of, say, 7 would seem to be in the right region though one might argue that it ought to be 6 or 8.

It is then a small step to deduce that the capital base of an ongoing life business is, say, 7 times the average annual surplus released in the previous five years. Alternatively this might be better expressed as 7 times the cost of bonus plus 7 times the transfer to profit and loss account in each case averaged over the past five years. For some measure of consistency between companies, the cost of bonus could be calculated on the statutory valuation basis.

It is likely that a similar figure would be obtained by taking the excess of assets at market value over the liabilities on a consistent gross premium basis without any allowance for future bonuses.

In the case of a new life office it may be some years before any transfer to profit and loss account is made and in the early years it is not unreasonable to suggest that the capital base should be the value deduced above or the paid-up share capital less the new business strain on business written, whichever is the greater.

6.7. Having established the concept of capital base and concluded that it is practical to determine a simple objective formula for it, the next stage is to see how life assurance policies fit into the picture. First, we should like to draw a straight comparison between the guaranteed benefits under life policies and debenture stock. The life office appeals for money (premiums) which it will invest to further a profitable enterprise and will, in due course, repay the money with interest (sum assured) ; this comparison, as we see it, is not affected by the fact that the sum assured may be paid earlier or later depending on mortality and the comparison holds for annuities as well as assurances. It is commercial practice for a trading company to restrict its debenture borrowings to a small multiple of its capital base and pressure for restriction should come both from the stockholders in view of the risks of excessive gearing and from prospective debenture holders seeking adequate security. Excessive life production implies equally serious risks to both stockholders and policyholders.

The answer from the stockholders' point of view must be for the auditors to take a much closer interest in the real financial meaning attached to the issue of life assurance policies, in particular without-profit policies. It should be noted that the full liability would be included for with-profits business even though this would include an allowance for future bonuses. Unit-linked business with maturity guarantees would rank as ordinary without-profits business (with an alternative settlement in units) though unit-linked business without maturity or surrender guarantees would only rank to the extent of non-linked benefits. From the consumer point of view the answer must be for the Department of Trade to limit the total liabilities which a life office can assume to a fixed multiple of its capital base. Our investigations suggest that the multiple should not exceed 10. Putting this another way, the capital base should be not less than 10% of the liabilities. There should also be a monetary minimum which could conveniently be taken as one half of the minimum paid-up capital, for which we have suggested £1m.

6.8. Let us now consider how this concept can be applied on a continuous basis. At a valuation date, the amount of the liabilities and capital base are known ; in respect of existing business, these can be calculated for the following year, and it is reasonable to assume that they will change uniformly during the year.

For each class of new business (for major classes, sub-groups by age or term) it is necessary to calculate per unit premium the liability and the reduction in capital base (i.e. the new business strain,

excluding the cost of one year's bonus, if any). Then at the end of each month (or more frequently if critical) the adjustments to liability and capital base can be calculated. Putting it another way round, the maximum new business for the year can be determined in advance, and the possibility of changing the proportions of different classes of new business can readily be investigated. Marketing plans can then be made with this restriction in mind.

6.9. It is interesting to consider why management would limit a trading company to a debenture issue of (say) twice its capital base and an actuary would permit the issue of without profit policies with liabilities of 20, 30 or more times the capital base. The answer may lie in the difference in accuracy with which the auditor values trading assets and liabilities and the actuary values the assets and liabilities of the life fund. The auditor can probably assess his values within narrow limits and relies upon the capital base for explicit margins whilst the actuary tries to ensure that his valuation bases contain adequate margins. Unfortunately, the existence of these implicit margins, let alone the value of them, becomes increasingly difficult to establish in times of rapidly changing financial conditions and even more difficult to define in government regulations.

There are other problems too. The value of the liability may be capable of calculation within acceptable limits but the value of the corresponding assets may rise or fall by 25% or more in a matter of weeks; reserves on a net premium basis will certainly not rise or fall to the same extent as major rises or falls in asset values. Also, investments may be properly matched to reasonable expectations in an ongoing sense but completely unmatched in an insolvency situation.

6.10. Summing up, we see that one of the main problems in life assurance solvency arises from what has been called "mushroom growth". Whilst the D.o.T. do, in fact, seek estimates of planned growth from newer offices, no limitations are specified in regulations, and there is no such control on an old small office which suddenly begins to expand rapidly.

Our proposition is that the capital base should be defined in regulations, and the actuary's certificate (para. 4.2) should contain a third statement:

(*c*) Confirmation that the capital base exceeds the greater of £½million or 10% of the liability, both calculated in accordance with the regulations.

As indicated in para. 4.5, this could be made a continuing obligation for the following 18 months.

6.11. It is important to note in retrospect that these regulations would have prevented the solvency problems encountered by a number of life offices in the last few years. Appendix II shows for 18 selected life offices during the period 1971/75 the ratio of published valuation liabilities to capital base, calculated by the methods of para. 6.6, except that the average has been taken over three years instead of five. It is interesting to note that of the eight offices with the highest ratio, four have increased their capital or transfer to profit and loss account, and two have been in financial difficulties.

7. CONCLUSIONS

7.1. In April 1976, Mr Peter Shore, the Secretary of State responsible for both the Policyholders Protection Act and the Regulations under the Insurance Companies Act 1974, stated publicly that " prevention is better than cure ". Neither the Policyholders Protection Act nor the valuation regulations are concerned with prevention; they supplement those parts of the Insurance Companies Act which are concerned with prevention but which have proved to be ineffective or inadequate.

7.2. In this paper we have considered how control over life companies can be improved to prevent insolvency, and for convenience our suggestions are summarised below:

(*a*) Establishment of a " capital base " in regulations, against which can be measured the maximum permitted liabilities, and incorporation of this concept into the annual certificate of the Appointed Actuary and the directors. Furthermore, we consider that the directors should give an annual undertaking that they would limit new business in the following year so that the total liability would not increase to such an extent as to exceed a specified multiple of the capital base.

(*b*) Addition to the annual certificate signed by the actuary of an obligation to inform the Department of Trade if the conditions of the certificates are not complied with at any time in the next eighteen months.

(*c*) Substantial increases in the statutory minimum figures for paid-up capital and solvency margin.

(*d*) The valuation regulations should not be regarded as an absolute measure of insolvency, but as a means of placing

companies in " probable order of insolvency ", for further investigation by the Department of Trade along the lines indicated in para. 5.4.

(*e*) The valuation regulations should provide for the value of the levy under the Policyholders Protection Act, for a specified level of future inflation in expenses, and for improvement in annuitants' mortality to ensure so far as is practicable that all offices use the same standards.

(*f*) For unit-linked business, investments should match those to which the benefits are linked.

(*g*) Policies with financial options should only be permitted if the Department of Trade are satisfied that the alternative benefits can all be provided within a defined investment strategy, coupled with adequate free reserves.

7.3. We are aware that many actuaries will be opposed to additional controls. However, these have become necessary for *solvency* purposes because :

(*a*) Recent history has shown that the present controls do not prevent insolvency, with consequent harm to the industry.

(*b*) Reputable companies are concerned to minimise their levy under the Policyholders Protection Act, which would have no function under a sound system.

(*c*) Within the E.E.C., other countries have controls which in some respects are more stringent than those suggested above, and if we are to have any influence in the design of a uniform system we must put our own house in order first.

7.4. It is of paramount importance that the actuary of a company should have freedom to exercise his judgement in the determination of an equitable distribution of surplus on a valuation basis of his own choosing, subject only to the prior requirement of solvency. This should be clearly seen as a separate subject and we would envisage that no company on the advice of its actuary would so depart from providing " reasonable expectations of policyholders and potential policyholders " that it would be called to account for its actions.

APPENDIX I

INSURANCE COMPANIES ACT 1974

Summary of Provisions which are related to Solvency of Life Companies

Authorisation of Companies

S.4. £50,000 minimum solvency (surplus), ignoring liability for shareholders' capital.

S.5. £100,000 minimum paid-up share capital.

S.7. Secretary of State to deem all directors and managers to be " fit and proper persons ".

Periodical Returns

S.13. Annual accounts and balance sheets required in the form laid down by regulations.

S.14. Assets and liabilities to be valued at least once every three years; the bases and form of report to be as specified in regulations.

S.15. Secretary of State to be advised of name and qualifications of Appointed Actuary, and of cessation of such appointment.

S.16. Prescribed annual statement for each class of business.

S.17. Accounts to be audited in the prescribed manner.

S.18. Signed copies of above documents and stockholders' accounts to be deposited with Secretary of State within six months (or three months if required under S.35).

S.19. Policyholders and stockholders entitled to copies of documents, unless Secretary of State allows dispensation.

S.21. Statements more frequent than annual may be prescribed for submission to the D.o.T. only.

Assets of Long-term Business

S.23. Assets and liabilities in respect of long-term business must be segregated from those relating to general business.

S.24. Long-term assets may only be used to meet long-term liabilities, with certain exceptions.

S.25. Permission of the Secretary of State is required to reduce the proportion of surplus allocated to policyholders (e.g. 90%) by more than ½%.

S.26. Transactions with " connected persons " restricted to 5% of assets.

Powers of Intervention

S.28. Secretary of State may intervene (*a*) to protect policyholders against risk of insolvency or inability to meet " reasonable

expectations " or (*b*) if the company fails to satisfy any of the provisions of the Act or (*c*) if any director or manager is deemed not to be a " fit and proper person ".

S.29. Secretary of State may place restrictions on new business of a company.

S.30. Secretary of State may place restrictions on investments of a company.

S.31. Secretary of State may require U.K. liabilities to be covered by U.K. assets.

S.34. Secretary of State may require an actuarial valuation at any time.

S.36. Secretary of State may require other documents to be produced.

S.37. Secretary of State may require company to take action to fulfil " reasonable expectations " of policyholders.

S.42/3. Provisions regarding transfer of long-term business.

Insolvency and Winding-up

S.44. In judging solvency of a composite company, long-term liabilities are the greater of the long-term fund or the calculated actuarial liabilities.

S.45. Company may be wound up in accordance with the Companies Act 1948, or on the petition of ten or more policyholders.

S.46. Company may be wound up on the petition of Secretary of State.

S.47. Excess of assets over liabilities for long-term business may be applied to general business and vice versa.

S.48. Liquidator should attempt to transfer long-term business as a going concern to another company : he may agree to varying the contracts and appoint a manager.

S.50. The court may reduce the contracts as an alternative to winding-up.

S.51. Provision for winding-up rules (until these are made, the winding-up provisions of this Act cannot come into force).

Miscellaneous

S.52/4. Approval or notification of changes in directors or managers.

S.56. Secretary of State and the company may agree to treat some long-term business as not long-term business and vice versa.

S.68. Provision for regulations on types of assets for unit-linked business.

S.78. Power to make regulations for valuation of assets and liabilities for the purposes of this Act.

APPENDIX II

Liability divided by Capital Base

Office No.	1971	1972	1973	1974	1975
1	3·8	—	—	2·9	—
2	4·0	—	—	3·2	—
3	4·1	—	—	3·8	—
4	4·7	—	—	3·8	—
5	4·4	4·5	4·2	3·7	3·9
6	—	4·9	—	—	4·3
7	—	—	1·3	3·3	4·4
8	6·0	6·5	6·2	4·3	5·6
9	3·9	3·9	4·3	3·9	5·7
10	9·3	8·7	8·7	6·9	7·3
11	5·4	—	7·7	8·0	7·4
12	7·9	7·4	19·8	20·5	9·4†
13	—	17·1	—	16·9	12·4†
14	36·7	56·6	—	6·2†	14·5
15	—	19·0	16·2	10·4	20·2
16	0·5	2·7	32·7	98·5	29·6†
17	8·8	75·3	86·1	55·7	41·9
18	—	15·3	52·2*	—	—

Notes

1. * Office in financial difficulties or declared insolvent; subsequent multiples not shown.
2. † Reductions in the multiple due to a major increase in the paid-up capital or in the transfer to profit and loss account.
3. Capital base is the greater of
   (*a*) 7 times the cost of bonus plus 7 times the annual transfer to profit and loss account, averaged over the previous three years, or
   (*b*) Paid-up share capital, which only applies to new offices; new business strain has not been deducted, because it could not be calculated.
4. All figures are taken from the returns to the Department of Trade.

SYNOPSIS

In recent years, the insolvency of Life Assurance Companies has become a subject of practical importance to the actuarial profession. In April 1976 Mr. Peter Shore, then Secretary of State, stated in this connection that " prevention is better than cure ". The authors of this paper contend that prevention has been neglected because of the more immediate problems of recognition when insolvency is reached and the action required after the event.

After some comments upon the legislation, the authors discuss the role of the Appointed Actuary. They then consider the main causes of insolvency, and suggest that the basic cause of the recent financial difficulties of certain Life Offices was rapid expansion based upon inadequate capital and free reserves. The paper argues the need for explicit solvency margins in preference to implicit ones and proposes a method for determining the capital base of a life office and the maximum growth rates which can be supported.

DISCUSSION

Mr. A. C. Baker, introducing the paper, said :—In the first place I should like to tell you how the paper originated. Some years ago at a time when a number of life offices found themselves in financial difficulties some colleagues and I began to take an interest in the matter and started to collect information about the total liabilities and asset strengths of a number of companies. One day I received word that a life office was in financial difficulties and I asked my colleagues if one of them would care to hazard a guess as to its name. I was told that Company X was at the top of our list, which was in fact the company in question, and I could only reply that he was correct and should delete that name and we would await the next to fall. This episode gave us an increased interest in our research and the results are now before you.

Secondly, I would emphasise that the paper is about " prevention " ; Mr. Graham and I hope that the discussion will not be on the details of the statutory or other valuation bases, which have already been the subject of extensive debate, but that speakers will concentrate on the principles underlying the prevention of insolvency of life offices.

Mr. J. M. G. Smart, opening the discussion, said :—I would like to start by congratulating the authors on producing a very interesting and readable paper. Solvency is one of my pet subjects and I am always delighted to have an opportunity to advance further the cause of the emerging sum method. I apologise in advance if you feel I have said it all already—this is only because I haven't changed my mind, for which I make no apology. One of my particular reasons for enjoying this paper is that in a curious way the development of the authors' method parallels that of a similar type of exercise done a year or so ago by a subgroup, of which I was a member (in fact half), of the Faculty's Valuation and Bonus Research Group. However, let us deal with a few fringe points first.

Sections 1-5 of the paper set the scene into which the authors can introduce their own original contribution, the concept of the capital base and its use in preventing insolvency by restricting the new business aspirations of actuarially young offices. There is much good common sense packed into these sections, and I would like to associate myself with many of the views stated. Paragraph 2.2 makes a good start—minimum paid-up capital of £100,000 is indeed woefully inadequate in these expensive times, and I would second the authors' suggestion of an increase to £1m. Paragraph 2.10 echoes views I have already expressed in this hall, and (as so frequently in the paper) gives our legislators a vote of no confidence.

If I might just dispose of our legislators right away (a pleasant thought !) it would be by adding a very loud " Hear, hear " to the sentiments of 3.6. The Policyholders Protection Act is a pernicious and anti-social piece of legislation. Of all the parties who might be deemed suitable for bailing out failed life assurance companies, surely other life assurance companies are the furthest down the list. Almost certainly they have lost already as a result of unfair competition from the failed ones. If my house is burgled why should I pay the fine when the burglar is caught ? In effect, the Department are saying " We'll authorise companies to do business but if *we* make mistakes *you*'ll pay ". So we must find a way of making that Act redundant.

Other areas where I agree entirely with the authors are, for example, the second half of 2.8, which (without using the word) accepts that solvency is

a matter of probability, not fact; and the suggestion in 7.2 (*e*) that the Department should lay down the inflation rate to be incorporated into valuations—I seem to recall that this same proposal received a horse-laugh when I put it forward here two years ago. Such is progress.

Indeed, there are very few points where I find much cause to disagree with the authors' views, which I find uniformly direct and refreshing, but I might mention one or two. At the beginning of 2.6 the relevance of market values lies primarily not in the realisation of them but in the indication they provide as to the future progress of income from those assets. The last sentence of the first paragraph of 2.6 I agree with in a way, though not in the way the authors would expect—to me it is just another clue that valuation in that sense is not the answer at all. Lastly, the authors' interpretation of "reasonable expectations" seems rather odd—I doubt if such expectations reduce as rapidly as suggested by the last sentence of 2.11, and in any case it is really the reasonable initial expectations that should have more weight.

Going back to the beginning, paragraph 1.1, part of the problem has crept up on the actuary just because of the fairly sudden transition recently from relative stability to extreme instability in asset markets. Actuaries are only human, and in view of the difficulty of defining solvency, appear to have concentrated too much on convincing themselves that the basis they need to produce competitive terms is in fact the right basis, and too little on studying the effects of their actions on the solvency of their business. The latter is covered by a rosy glow of optimism, and the non-failure of his office in the past is seen as confirmation that his technique is satisfactory, rather than a result of luck being on his side so far. The problem is certainly great, and the first hurdle is the language or communication one. It seems to be a stumbling block for many that a particular valuation and its basis are neither the cause nor the effect of the solvency position, but merely measure it within the limits allowed by the assumptions made. Thus I distrust a sequence of statements like that in 2.7—each sentence may be acceptable on its own but the order suggests that the fact that the office would always be solvent is consequent on the valuation basis being conservative—this is not so, of course. Valuation doesn't affect the position, so for new offices in particular, especially because of the inherent delays, valuation is an inadequate safeguard. Some other restrictions are required. But where do we start?

If the paid-up capital provided is adequate, the first policy written has superlative cover but each one thereafter will tend to reduce the degree of solvency (as we may term it) from, say, 10,000% towards, and if we are not careful below, 100%. Thus judgement of the optimum rate of procuration of new business, and its terms, demands great skill and integrity and the authors have very reasonably set out to supply firm constraints on the freedom available in the exercise of that judgement. Personally I would like to see also some restriction on premium rate bases, and in particular that combination of premium rates and bonus projections (in quotations) that gives the policyholder his "reasonable expectations" from the policy.

The only caveat I would enter at this stage is that we should beware that we don't produce yet another control system to sit on top of existing ones—we already tend to have two valuation systems, the one we use to please the D.o.T. and the one we use for our own purposes. If a full investigation, as suggested in 5.4 of the paper, involves desirably an analysis of emerging costs, why not just ask for that in the first place? The process may be laborious (though probably not as laborious as the authors think) but so is any alternative, e.g. the work involved in down-

grading benefits under the Policyholders Protection Act where premiums have proved grossly inadequate—why wait till insolvency to pick this up, when the same method can tell you that too ?

The symptoms of incipient insolvency are usually fairly easy to spot and the main problem at the moment is the delay between the onset of the disease and the start of treatment. Like the authors I am much more interested in recognition (and, even more so, prevention) than I am in cure, so I shall take up at section 5 which lists six major areas likely to give rise to insolvency. These are all very real and reasonable, though the interesting thing is that the list doesn't contain overexpansion of the business, at least explicitly. The authors treat overexpansion as a sub-heading of " expenses ", on the grounds that high initial costs (even though apparently adequately allowed for in premium rates) result in negative reserves in the early years, so that adverse options not to renew are available against the office. I find their proposed solution intriguing, and it occurs to me that the ASLO and LOA could take a simple first step towards its implementation by abolishing the small office concession on commission rates, which is surely at variance with sound business practice.

We are, I suppose, always going to have to produce *some* figures to the D.o.T. and I most heartily agree with the authors when they aim their method at reducing the state of an office to a single figure index, a kind of P/E ratio, which will enable offices to be set out usefully in an order of merit or demerit. There are many such indices which we could construct but the authors have chosen what we may call an L/C ratio, liabilities divided by capital base. There is much good stuff in section 6 where they develop their system by parallel comparison with the financing of industry. The nub of the matter is contained in 6.6 where the central feature, the capital base, is quantified. I appreciate the general method but I must admit to having had some difficulty in following what results might be obtained in some cases. For example, in a mutual office transacting non-profit business only (not an office to be encouraged, I admit) it would seem that both cost of bonus and transfer to Profit and Loss account could be zero which would give nonsense results—but what does this imply for offices with different proportions of with-profit and non-profit business ? The effect of changes in valuation basis during the period averaged seems a bit obscure too, whether voluntary or in accordance with changing outside conditions. Then on the face of it an office with a mind to expansion could be tempted to weaken its valuation basis to give a greater capital base and thus a greater new business quota, which seems the wrong way round. Still, the basic idea, if it can be got to work, seems a good one, one side benefit not mentioned by the authors appearing to be that the office with the lower premium rates will use up its new business quota faster than its less cut-throat competitor, which would be allowed more business (if it can get it). The care thus enjoined on management to choose premium rates so that they can just obtain the maximum business permissible with the maximum economy must be a useful discipline. But in the way that we never ate so many sweets as when they were rationed, a calculated maximum could have the opposite effect from that intended.

This concept of an order of merit was also in the minds of the research group I mentioned earlier when it discussed Valuation Regulations recently. Briefly we emerged with an index figure which we called the " degree of solvency ", calculated as A/L where A and L are the values (on prescribed bases) of assets and liabilities respectively. Actually we introduced two values of L, L_1 involving a nil bonus rate in future and L_2 involving a bonus rate equal to the greatest of the last declared rate, the rate currently

being allotted, and the highest rate expected to be involved in claims or quotation illustrations until the next valuation. The progress of these two degrees of solvency over the years should bring doubtful cases to the Department's attention before they become critical. We categorised offices for different treatment according to the values of A/L but this is not the place to go deeply into that. The main points to note are the single index as a basic indicator, and that our method also tries to stop overoptimistic bonus illustrations in quotations by not allowing such to exceed rates justified by the previous valuation. Incidentally we made use of the 90% provision of the Policyholders Protection Act by adding to the usual liability the value of 10% of the benefits, but none of the premiums, of reassured cases, this being the part we could not rely on recouping. This corresponds to the authors' 5.13.

How this method would compare in effect with that of the authors I find difficult to judge. I get the feeling though that the method of the paper, while a step in the right direction, is still no more than a step. Some recent financial troubles have been caused by unsound methods that the L/C ratio wouldn't necessarily detect, in particular the unvalued option, etc., where premium rates are all-important and valuation is too late. Indeed I wonder if overexpansion in itself is really a problem. If premium rates are adequate it seems wrong to prevent an office selling as much as it can in fair competition. Insolvency may become *apparent* as overexpansion, but this is really just a symptom—it is more likely that it is inadequate rates and (even if rates are adequate) excessive commission which will destroy the likelihood of the policyholder achieving his reasonable expectations.

Still, overexpansion usually will have undesirable concomitants in the way of overheads, disorganisation leading to lack of proper statistics on which to base sound decisions and so on, so I would think that the authors' ratio would be valuable until more comprehensive methods become acceptable. My lack of full enthusiasm for the capital base approach has two main sources. Firstly, I find it difficult to spot clear conclusions from the figures shown in Appendix II, which should be the proof of its worth. One year before hitting financial difficulties one office (No. 18) had not reached a notably high L/C ratio ; on the other hand some offices seem to survive in spite of very high ratios, e.g. office 17 seems to be progressing favourably now though it wouldn't nearly have passed the authors' test at any time since 1971. Secondly, I don't see that it tackles enough of the causes of insolvency. An alternative way to 5.1 of analysing these causes would be into a short list of three—unsound methods, fraud, and bad luck—and it is not clear how these match with the authors' list. We are mostly concerned here with unsound methods of course, but mustn't ignore the other two. Bad luck can strike due to adverse randomness (in mortality and so on) hitting an office with quite ordinary rates and methods. It can't really be stopped, so trying to prevent all insolvencies must pose unacceptable restraints on rates and distribution of surplus.

The emerging sum method, on the other hand, can lead to control over most causes of insolvency, not only overexpansion but all the others listed in 5.1 and almost indeed with bad luck too ! Fraud regrettably is beyond even it ! I won't deave you with too much rhetoric about my method since that gramophone record has already had a few whirls, but I would emphasise again that it has the great beauty that the same method, with the same assumptions built in, can provide not only a solvency check, but premium rates, surrender value terms, policy alteration terms, bonus rate suggestions and everything. It is when people use independent methods for all these things that they inevitably get inconsistencies and are driven to using

judgement where science is quite capable of supplying the optimum answer. To help communications perhaps I might explain two points about the emerging sum method, regarding which I have found misconceptions to be rife.

1. Though sometimes called "matching valuation", it really is an emerging sum method and in no way insists that matching be indulged in. The act of matching is not so important as knowing the effect of the present position (whether matched or not) on the health of the business. In any case matching is equally based on assumptions and is not a matter of certainty.
2. Like all other elements in the actuary's basis, the bonus rate is an input to, not an output from, the calculations. The output is generally a probability, though the calculations can clearly be inverted. Thus the same method can assess the ability of the office to maintain any given bonus rate (with its obvious two practical uses), *and* find what premiums it requires from a new policy so that the latter obtains fair treatment vis-à-vis existing policies. The sad feature is that life office actuaries, with their life office managers' hats on, don't really want to know this—all they want is competitive rates and they are scared of any system which might suggest that their nicely competitive rates are inadequate. *Facilis Descensus Averno.*

This still leaves me much in agreement with most of what the authors say, apart (regrettably) from their L/C ratio which I think, though interesting, doesn't really go far enough. But suggestions (*b*) to (*g*) of section 7.2 are all good sound sense.

The long and the short of it is that life assurance business hinges on probabilities rather than certainties, and only the emerging sum method is geared to cope with probabilities. Words like the "actuarial caution" used in 2.7 are tacit admittance of probability, but no one seems interested in quantifying the amount of caution involved. Why 7% and not 7½% or 6½%? All are cautious, but how cautious? That's the question, and I have still not seen anything offered which begins to compare with my beautiful emerging sum evaluation as the sure and proper indicator to the best answer. The only problem it can't cope with is fraud, and here the only solution seems to be to make laws which will deal severely with perpetrators of fraud, by having managers put their freedom at stake if they depart in any financial way from rates, methods and limits approved in advance by the Appointed Actuary, and by Appointed Actuaries putting their professional heads on the block if they introduce or tolerate methods which are unsound in a professional sense. But I'm afraid I despair of our legislators—the only suitable quotation to apply to them at present is "Lord forgive them, they know not what they do!"

Thanks again to the authors for a most enjoyable and thought-provoking paper.

Mr. C. M. Stewart:—I feel certain you would wish discussion this evening to be centred upon the proposition in section 6 of the paper and the conclusions in section 7. I shall therefore concentrate my remarks on those sections and refer to earlier sections only where it is relevant to do so. But it will mean a good deal of forbearance on my part as I find many of the comments in the earlier sections stimulating, if not actually provoking.

The authors' first proposition is that, as an absolute minimum, there should be an excess of assets over liabilities of £½m. Under present U.K. law there need, strictly speaking, be no excess at all. However, it is public knowledge that Article 20 of the E.E.C. Draft Life Directive would, if

implemented, require such an excess, known as the Minimum Guarantee Fund. The figure published 3 years ago was 600,000 Units of Account which then represented something like £¼m, but with inflation there has been pressure to increase the 600,000 to a higher figure, and when one takes account also of the decline in value of the £ sterling relative to the Unit of Account, it looks as if the Directive may end up with something not far short of the authors' figure of £½m.

Their second proposition is that a minimum paid-up share capital of £1m should be required, presumably for new authorisations—it could hardly be made retrospective. This is a rather less important proposal. At present the Department of Trade expects a larger figure than the minimum specified in the 1967 Act (which the authors describe as " woefully inadequate ") and in any event the Appointed Actuary must vouch for the adequacy of the capital in relation to the company's business plans. But the authors' suggestion of £1m, of which at least £½m should remain intact, does not look unreasonable when taken in the context of their other proposals.

The third proposition is that a limit should be set to the life fund of 10 times the Capital Base, which would be either the free assets or 7 times the average annual distribution of surplus. There is nothing corresponding to this at present in our system of supervision. Of course, the authorities examine a company's statutory returns and assess its prospects and they expect the Appointed Actuary, complying with the Institute/Faculty Guide, to have his finger on the pulse and, I quote, " to be satisfied as to the continuing financial state of the company ". Under the authors' proposals some of the responsibilities and discretions of the actuary would be taken away.

Looking again at the E.E.C. Directive, Article 19 proposes that there should be a solvency margin of 4% of the liabilities plus 0·3% of the capital sum at risk. For convenience we might call this 5% of the liabilities. This resembles the authors' Capital Base, but the limit to the life fund is in effect 20 times the Capital Base, i.e. only half as severe as the authors' rule when related to free assets.

When instead the flow of profits is taken as the Capital Base, the authors choose a factor of 7, whereas Article 18 (3) (*b*) of the Draft Directive seems likely to take a higher figure possibly with an upper limit of 10, but would count only 50% of the profits, giving a factor of 5. The authors' proposal is thus that the life fund should be limited to 70 times the annual profits, so that annual profits would have to exceed 1½% of the life fund. The Draft Directive, on the other hand, effectively proposes that the life fund should be limited to 5 × 20, i.e. 100 times the annual profits, so that annual profits would have to exceed 1% of the life fund, i.e. about two-thirds the severity of the authors' rule.

Mr. President, I must say in passing that I disagree with the authors' assertion in paragraph 6.5 (*d*) that the 50% multiplier is designed to allow for over-generous past profit distributions. I am certain they are mistaken. In my experience those who designed it had no such thought in mind. It was entirely a precaution for the future and implied no criticism of the level of past distributions.

It would be interesting to know whether the authors' researches have led them to a definite conclusion that the standards emerging in the E.E.C. are not strong enough, or whether their intention is rather to promote discussion on the principles involved and they would regard the precise formula as negotiable. I can tell them, if others have not already done so, that there are a number of companies, old established mutuals included, with a large proportion of non-profit annuity business in their

portfolios, which do not satisfy the authors' standard although their Appointed Actuaries appear satisfied with the situation. It is not easy to make an annual profit of 1½% on non-profit annuity business, but perhaps the authors are especially anxious about this class of business ; I note their recommendation that all companies should be required to use the same mortality basis which should allow for future improvement. Would they care to make a suggestion ?

The acid test of the authors' proposal is its impact on companies such as those mentioned which just fail to meet their standard, i.e. for which the figure in Appendix II would be a little bigger than 10. The authors would say that such a company should have restricted its new business so as to avoid such a situation arising but is there no alternative ? Apparently not. Such a company would be unable to point to margins in its valuation basis, profits ploughed back, or surplus carried forward undistributed—only surplus distributed is to count. Like the opener, I find this anomalous ; there would be pressure on the actuary to distribute more surplus and weaken the company in order to increase its capital base and allow it to expand.

My own opinion, Mr. President, is that the authors' proposal applies rather too severe a standard and is defective in that it does not recognise surplus carried forward or margins in the valuation of liabilities as contributing to the capital base *unless* the company goes the whole hog and revalues liabilities on a weaker basis in order to disclose an excess of assets over liabilities large enough to be *substituted* for past-profits as the capital base. If we are to go down that road I would suggest that we consider adopting explicit margins as the norm, e.g. reducing the interest margin in the proposed rules for valuing liabilities from 10% to 5%, and requiring companies to show an excess of assets over liabilities of 5% or so as in the Draft Directive. From a *supervisory* point of view there would be advantages in such a system. I would see no objection to allowing profits to count against this explicit margin requirement, as proposed in Article 18 (3) (*b*), but would not regard it as important given the weakening of valuation standards.

Mr. President, my comments have so far been related principally to conventional business. It would not be right for me to take up more of your time in order to deal at length with investment-linked business but may I just say that I don't think the authors' exclusion of non-maturity guaranteed contracts is good enough and that for maturity guaranteed contracts an explicit margin as I have just suggested would be much more suitable that their past profits Capital Base.

In conclusion, may I point out that, although the authors are very critical of the unmodified net premium method in paragraph 2.6—with some justification let it be said— they do not themselves do more than suggest in paragraph 6.7 that the liability " would include an allowance for future bonus ". What allowance ? Who would decide ? What do they suggest ?

Mr. R. M. Harvey :—First of all I should like to congratulate the authors on their introduction of some new and interesting ideas into the current discussions on valuation regulations for life assurance companies.

As a preliminary comment I would say there is no doubt that some of those concerned in one way or another with the transaction of life business will find themselves attracted to the idea of explicit rather than implicit solvency margins for life assurance companies. I imagine that those attracted most strongly will be those concerned with monitoring the

progress of life assurance companies rather than those concerned with the actual running of the companies. As a commentator on these companies myself, I can assure the authors that were such an approach adopted then although I and my colleagues may try to avoid falling into the trap, the volume of uninformed and misinformed comment on both the proprietary and other life offices would increase very considerably.

We must define first of all what is meant by a measure of solvency and what it is to be used for. The concern of this paper is not just with determining whether offices are currently solvent or insolvent but also with assessing the likelihood of an office becoming insolvent at some time in the future. It is at this point that I must agree with the authors in their view stated in paragraph 7.2, sub-section (*d*) that the valuation regulations should not be regarded as an absolute measure of solvency but rather as a means of placing companies in " probable order of insolvency ". Besides the level of premium rates, fixed by the company in response to a competitive market, insolvency will depend on a number of apparently increasingly volatile outside factors operating many years into the future—the main ones being expense inflation, the long-term rate of interest and capital values of equities and property. A single measure cannot provide an assessment of the absolute probability of insolvency for an office.

Although I agree with the authors that a ranking by probable insolvency can be hoped for, I am not sure that any one measure can be expected to achieve this. Certainly the relationship to determine is that between the free reserves or capital base and the extent to which the relationship between income and outgo might deviate adversely from that anticipated.

The measure of the capital base proposed by the authors should be a reasonable assessment of the capital base if bonuses and shareholders' profits reflect accurately the earning power of the business. An unduly generous distribution policy, perhaps during a period of exceptionally high asset values, would produce an inaccurate estimate of the capital base once asset values returned to a more stable, lower level and of course the use of a three- or five-year average would mean a slow reaction in the measure if conditions deteriorated very rapidly. One further point that concerns me here is that the capital base is contingent upon with-profits policyholders maintaining their contracts in force. Under adverse circumstances this may not happen.

My main reservations concern the use of the valuation liability as an indication of the risk involved in the office's business when risks can vary with both the nature of the liabilities and the assets. As an obvious example, consider two offices each writing only non-profit business. Assume one of the offices to be invested 20% in equities and 80% in matched gilts and the other in exactly the opposite proportions. I think that generally the first office would be considered less likely to fail to meet its obligations than the second, even though one could postulate conditions such as run-away inflation when quite the opposite might happen.

Similarly, an office expanding its branch network and head office functions in order to increase new business may have, at least initially, much the same relationship between the capital base and the liability as an office maintaining modest new business growth.

I feel that the authors' basis could well be used as the principal measure of solvency but in conjunction with other relatively simple indications of risk. I would suggest the following :

1. Distribution of annual and single premium income by class and into with-profit and non-profit business.
2. Asset distribution by class, distinguishing each of gilt-edged stocks,

other fixed interest stocks and mortgages, equities and property. For other fixed interest stocks one should probably require an indication of the risk involved, taking the differential between the yield on the fixed interest portfolio and that on 20-year gilt-edged stocks. It would obviously be desirable to have a measure of the quality of the equity and property portfolios but this is less easy than for fixed interest stocks. High yielding equities and properties do not necessarily carry higher risks than low yielding ones but rather lower potential growth. In fact they may involve less risk than highly rated low yielding investments.

3. The relationship between the valuation rate of interest and that earned, bearing in mind the distribution of assets between low yielding equities and property and high yielding fixed interest stocks and the quality of the fixed interest portfolio.
4. Expense ratios—with each office allocating each of premiums, expenses and commission between new business and renewal to give more meaningful figures than the simple ratios currently used.

It may be argued that these are some of the factors already taken into account in a detailed assessment of solvency and constitute too much confusing detail. However, they could be summarised very concisely, and I feel give a more effective indication of the true value of the solvency margins. We have already seen in the debates on solvency margins for non-life assurance companies and on capital ratios for banks an increasing awareness that different types of business and differing balance sheets warrant different levels of solvency margins. The same must be true for life assurance business. The measures I propose also have the advantage of being monitored on a quarterly basis if this should be considered necessary.

There is one further point that I would like to make. The authors put forward as one possible measure of the value of the life business the stock market valuation for a proprietary company. This of course takes into account shareholders' earnings from future new business which may be considered inappropriate for solvency purposes, as well as profits to come from existing business and the shareholders' proportion of the free estate. This does not, however, allow for the policyholders' proportion of the estate. For these reasons, it appears an unsatisfactory measure of the capital base of the office.

In conclusion I would like to say that I found the paper a most stimulating one and I would like again to congratulate the authors.

Mr. G. C. Archibald:—I would like first of all to pick up various points made by previous speakers. Mr. Smart, in criticising the Policyholders Protection Act, compared the surviving life offices to the man who has had his house burgled and is then asked to pay the burglar's fine. Carrying the analogy further I would maintain that the householder should pay the fine if the alternative to doing so is damaging to himself. The parallel is obvious. Life offices help their fellows in trouble to save the industry's collective reputation.

Mr. Smart also mentioned the science and precision of the emerging sum method of valuation. I can see no science nor precision in any method of valuation which has to assume various interest rates and expenses at various times in the future. No method of valuation can be exact and the emerging sum method is almost as vague about the future survival of an office as the net premium method, yet it is infinitely more cumbersome.

The previous speaker expressed the fear that the large-scale surrender of

with-profit policies might adversely affect the solvency ratio of an office. I would suggest that this could be avoided if the basis on which the surrender values were calculated was such that the solvency ratio remained unchanged.

Turning to the paper itself I would like to comment on the main suggestion in the paper, namely that offices should produce a solvency ratio calculated by use of their capital base ; where capital base is as defined by the authors. The paper suggests that ideally this solvency ratio should be less than ten. However, this raises the question as to what is to happen to those offices whose solvency ratio is at present greater than ten. In Appendix II we see that out of the eighteen offices surveyed roughly a quarter had ratios over ten. If the solvency ratio is to be adopted as the authorities' yardstick by which to measure companies' solvency, a league table, as outlined in 2.9 of the paper, will no doubt be drawn up by interested parties. What then would be the fate of those offices at the bottom of this league table ? It is unlikely that they would attract much new business as insurance brokers and the public in general would shy away from them. Indeed, existing policyholders might be encouraged to terminate, probably on adverse terms. Thus we might witness a " run on the bank " situation with consequent instability both for the company and possibly for the industry.

Mr. Stewart mentioned that the solvency ratio test provides an incentive for offices with high ratios to weaken their valuation basis as any weakening would cause a fall in the value of the liabilities and a rise in the capital base. However, the valuation regulations provide a limit to the amount of weakening permitted. If a company, after valuing its liabilities on the weakest basis possible, still has too high a ratio, it will have to look elsewhere for methods of reducing its solvency ratio in the future. One such way is to move away from a reversionary bonus towards a terminal bonus as the method of rewarding policyholders. Reversionary bonus, once it vests, is irrevocable, whereas terminal bonus, although it may be funded implicitly, will not appear in a net premium valuation. Now a trend to terminal bonus is in reality a trend away from the traditional with-profit philosophy towards a unit-linked one. The latter type of business has the advantage of assuring solvency since the maturity value of a policy is dependent on the stock market level at maturity, whereas a traditional with-profit policyholder has always received a maturity value which reflected the average investment return throughout the duration of the policy. It would indeed be unfortunate if, because of the authors' suggestion, the traditional offices were less willing to protect the policyholder against the volatility of the stock market by bearing this investment risk.

Furthermore, since it is unlikely that a realistic return would be available on the large amount of capital required to set up a new " reversionary bonus " type office, this suggestion of the authors not only encourages existing offices to use terminal bonuses it will also discourage the establishment of new offices to run traditional business. But perhaps this is the whole point of the exercise.

Mr. President, may I conclude by adding my congratulations to the authors on providing us tonight with a very interesting and stimulating paper.

Mr. F. R. Wales :—I regret to say that I am yet another visitor from the South.

First I must declare my interest. I am the Appointed Actuary of a young life office—therefore it will come as no surprise to you or the authors to learn of my total opposition to much of tonight's paper.

I consider the authors' approach to be simplistic and subjective, and they fail completely to produce objective arguments based on analyses of real life situations.

Let me start by coming straight to the fundamental proposition—the capital base. Of course, a life assurance company must have an adequate capital base, but the statistic chosen by the authors no more represents the capital base of the company or its true solvency margin than does the paid-up share capital. To begin with the only relevance that past surplus has to the capital base is that, in so far as it has been distributed, the solvency margin of the company is lower than it would otherwise have been. It is common practice for companies to retain profits deliberately by using stronger valuation bases than are necessary—surely a company that has followed such a course must be stronger than if it had consistently disclosed surpluses and made distributions to shareholders. Any office is a complex of branches of business written at different times, with different profit margins and with different terms to run. Past profits may represent an amalgam of large surpluses from business shortly due to expire, and losses from other lines with a longer period to run. A multiplier of 7 as suggested by the authors would be a disastrous overestimate if the business were due to run off in the next 2 years. (I can assure the authors that such situations can and do occur in practice.) But why 7 times, why do we have no demonstration of the appropriateness of these figures, why do we not have any practical examples ?

For the concept to have any meaning it must, as the authors suggest, be based upon a statutory valuation basis. However, no statutory valuation basis is proposed for this country. *Rules* are proposed for determining the minimum basis for the valuation of liabilities. However, I for one do not wish to be forced to seek the weakest basis that I feel I can get away with. The authors' suggested rule would, however, force me into that position.

The justification for the authors' approach appears to be by way of analogy with a debenture issue by a trading company. I fail to see the relevance of this analogy and I object to spurious justification of a hypothesis by results drawn from analogy. This cannot be in the best scientific traditions of the profession. A trading company issues debentures for the purpose of borrowing money to finance trading activities that are in no way related to the act of borrowing. These activities are relatively risky ventures. The issue of a guaranteed life assurance policy does not resemble a debenture in any way. The premiums received from policyholders are invested in matching investments with the sole objective of putting the company in a position to meet its liability to the policyholders. There are no investments in risky ventures or if there are, these represent mismatching and will require appropriate additional provisions to be made by the company.

Some liabilities assumed by companies are riskier than others and are subject to wider fluctuations. The authors, with their extensive experience of composite companies, are also aware of this basic concept. Thus, it really is rather absurd to suggest that the capital base required for all types of life assurance policies is the same fixed multiple of the calculated liability. (Incidentally, how is the multiple derived ? Why do we have no numerical examples ? What is the magic of £1m or 10% ? Why not £10m or 1% ?) Let me give an example of two types of non-profit policy written by my own company. One type is a 1-year deposit bond where the amount deposited is returned at the end of 1 year with interest. The interest is not guaranteed but is based upon the earnings from deposits with banks and

local authorities. It is not an investment-linked plan as such and according to the authors' theory, to write such a plan it would be necessary for the company to put up capital equal to 10% of the single premium—despite the fact that such premiums would be invested in deposits with local authorities and clearing banks with a negligible risk of default—investments that are not indeed subject to any form of restriction in the Valuation of Assets Regulations. On the other hand, my company also writes whole of life non-profit assurances under which zillmerised reserves for young lives after elimination of negative values could be zero for some years ahead. According to the authors' theory the capital base required is zero but in my view the capital base required is substantial.

In conclusion I think that it is a pity that a paper such as this, calling for substantial increases in reserves and capital of life assurance companies, should be presented at such a respected forum as the Faculty on the basis of such shallow research. Views expressed in this Hall tend to be reported and are sometimes taken as fairly authoritative statements of the view of the profession. It would be unfortunate if tonight's paper is taken as such.

Mr. A. Duval:—I am in broad agreement with the authors in their proposition that the future expansion of life assurance companies should be limited by the amount of capital resources available. I would question the value to be placed upon the rather subjective factors of seven times and ten times mentioned in paragraphs 6.6 and 6.7, but I feel that this concept can be refined in order to produce a workable solution.

The number of life offices authorised by the Department of Trade increased from 166 in 1966 to 268 in 1976 and this proliferation of new companies underlines the need for some form of prospective control over rate of expansion.

Of the causes of insolvency discussed in the paper by far the most important is inadequate premium rates and the method of continuous control outlined in paragraph 6.8 allows for this factor.

In paragraph 6.11 it is stated that the regulations proposed by the authors "would have prevented the solvency problems encountered by a number of life offices in the last few years". I do not agree that all such solvency problems would have been prevented by these means; in particular they would have had no effect where insolvency was due to the slump on the Stock Exchange allied with guaranteed surrender values under income bonds.

Mr. P. A. C. Seymour:—I found the concepts of this paper very stimulating, and I should like to thank the authors for being so thought-provoking. (It seems, however, from some of the earlier remarks that being provocative is a dangerous game.)

The authors have claimed as one of their main reasons for taking a fresh look at solvency, the passing of the Policyholders Protection Act. I am not surprised to find that Act coming under fire in a paper written to the Faculty, since Scottish opposition to it is well known, and was recently reiterated forcibly in London. But surely it is going too far to say that it is the Act that necessitates "fresh thinking". The prevention of insolvency must have always been a prime objective of the controlling authorities, Act or no Act.

It seems to me that the meat of the paper lies in paragraphs 6.6 and 6.7. One cannot quarrel with the idea of constraining an office to operate "prudently" within the limits laid down by its capital base. The analogy with an industrial concern issuing debentures is also helpful. The most

fundamental problem is how to determine the capital base in the first place. I just cannot accept the authors' simple " multiple " rule. I am not arguing about what the multiplier should be, 6, 7 or 8, however the authors arrived at these figures, but about the method itself.

Perhaps I could return to the industrial analogy. In an industrial concern, profits are earned and the directors then decide on how much to distribute, and how much to plough back. The amounts ploughed back will be invested in tangible assets, such as factories and equipment, so increasing the company's capital base in a manner readily evaluated by an accountant. The existence of the new assets will create additional security for more debenture borrowing, if necessary.

In a life office, the same ploughing back of profits occurs but it is totally obscured by the actuary. Indeed, the directors would seldom take a conscious decision as to how much to plough back and how much to distribute. From gross surplus on the old business is automatically deducted the new business strain on the new business, and only the net result is ever published.

So we come to my reason for objecting to the multiplier method. It operates only on the net surplus, after the generally unconscious decision to plough back. In other words, using the industrial analogy, it deals with dividends rather than earnings. I think most of you would agree that this is not the best approach, and it can have some curious consequences.

In inflationary times, an office may have to grow in money terms quite rapidly, in order merely to maintain its position in real terms. There is therefore a tendency to plough back rather than distribute. My own calculations suggest that a new office growing at say 15% per annum may never pay a dividend—all its surplus being continually ploughed back into the next year's business. Of course, after 20 years of this, and assuming the premium bases, expense levels and so on were satisfactory, the fund could be closed, and a very substantial stream of profits would emerge. In other words, the ploughing back will have built up the capital base, as we would expect.

Can I therefore suggest the method requires further consideration. I seem to remember hearing one member of the GAD suggest that valuation returns should show gross surplus on old business, and new business strain separately. His suggestion was aimed at checking there *was* a gross surplus on all business, otherwise by definition the valuation basis is too weak. But in today's context it would also allow the use of an earnings multiple, rather than one based on dividends.

Mr. J. Plymen:—The authors' method of valuing the capital base in section 6.6 employs rather curious logic, treating the offices as something like a closed fund. The use of annual surpluses, averaged over the last five years, is conservative as U.K. life surpluses generally, apart from the year 1974, reveal a steady upward trend. Normally valuation factors for a business like this would be applied to " estimated next year's profits " and these profits would be perhaps 25% higher than the five-year average. I suspect that the E.E.C. basis is designed for continental offices, with a higher non-participating proportion than those in U.K. and with a shareholders' participation that is the residue after paying bonuses rather than as in the U.K. where the shareholders' participation is in parallel with the bonuses.

In the U.K. a traditional quoted ordinary life office reveals a share price something like 16-20 times the estimated 1976 shareholders' earnings, or 1·6 to 2·0 times the surplus of an office where 1/10th of the profits go to

shareholders. The authors' 7 times multiple applied to 75% of 1976 profits will make for a 5 times multiple of current surplus, i.e. something like 2½ times the market value of the shares. For example, a typical company has a market valuation of its share capital of £26m and an annual surplus in 1975 around £10m. Seven years' purchase of the five-year average of profits would be some £58m, i.e. just over twice the market valuation of the shares. For an office like this, with the 90-10 participation, the value of the share capital on the stock exchange is much too low a capital base. After all the " estate " supporting the with-profit policyholders' bonuses is at risk along with the shareholders' capital and should certainly contribute to the capital base. In fact, for such an office the authors' basis is distinctly conservative, being based on a low multiple and out-of-date earnings. Perhaps the authors are informally allowing for some overdistribution in the past, particularly earnings from investment write-ups which may not recur. It is interesting to point out that for the eight major U.K. quoted life offices, the total valuation liabilities are around 8 times the market valuation of the share capital. If, as I suggest, the authors' method produces something like 2½ times the valuation of the share capital, then the liability divided by the capital base averages something like 3·2 times, which agrees broadly with the figures shown for the first five or six offices in Appendix II.

In practice, I think the authors' formula is more designed for non-participating offices where the shareholders get 100% of profits. For the one U.K. quoted office of this description the current price/earnings ratio on 1976 earnings is 8·5 to 9 times. In fact, for this type of office, with no with-profit policyholders to fall back on, the stock market valuation is a good approximation to the capital base. For the office concerned 1976 profits will be something like £5m so that 7 times multiple of these profits is £35m, whereas the current share valuation is £41m.

The authors' valuation method works well for a mutual office, again giving conservative estimates. Clearly, however, the authors' method falls down for a new non-participating company producing losses rather than surpluses. For such offices, published capital reinforced by surplus on a solvency valuation is the best guide. The most difficult situation arises from an office of this sort, which is part of a conglomerate where the published capital cannot be specifically allocated to the life business.

Coming to the question of the liabilities, I feel that the authors get into very deep water when applying the capital base to calculate what I call the liability cover. I feel that their points, mentioned in the second paragraph of section 6.7, are greatly condensed. A whole Faculty paper would be needed to assess what multiple of the capital base can be permitted for different types of life assurance business. The multiple is not determined only by the size of the liability but depends on the investment policy and whether the investments are matched or not. It is interesting to note that the authors admit rightly that, if they are dealing with a unit-linked office with no capital guarantees or onerous surrender values, the liability is restricted to the total of the purchased units. As these units are usually covered by matching investments an insurance office of this type carries the minimum of solvency problems.

Dr. W. F. Scott:—I would like to make two brief points. Firstly, the authors appear to be suggesting the need for solvency margins, previously confined to non-life insurance, in life assurance business. Surely these can only be necessary if there is something wrong with the valuations of liabilities and assets, and, if so, attention should be directed to the valuation

bases. Of course, the authors are rightly concerned that insolvency (i.e. the value of the assets is less than the value of the liabilities) may occur at times other than the valuation dates, but if the actuary is informed of any changes of policy this is surely a matter of common sense.

The other point concerns maturity guarantees, on which I have recently presented a paper to the Faculty. I do not agree with the authors' suggestion that unit-linked contracts containing maturity guarantees should be treated as conventional without-profits policies, because the assets underlying these forms of business are, or should be, different.

Mr. E. A. Johnston :—As an unashamed guest I would like to thank you, Mr. President, for your invitation. It is especially pleasant to visit the Faculty when the paper comprises some new thinking about the principles and methods of supervision of life assurance companies, a subject on which there has been a dearth of independent research in recent years with the honourable exception of the six principles and of course work on methods of valuation. Most of the new ideas which are now being put into effect originated on the non-life side and have been applied to life assurance. As the Acts which govern this subject have recently been revised, and the revisions are only now coming into force, it may seem either too late or too soon to propose a revision of the fundamentals of the system, but the ball has to start rolling sometime and it will not be many years before we have practical experience of the working of the revised system. I hope, Sir, that tonight's paper represents a new trend and will prove to be the first of many written independently, not merely as a reaction to some government draft or proposal.

Although the authors may not have the final answer, they have put their finger on the all-important relationship between capital and the volume of business. The question of capital is basic to supervision, and indeed to the operation of the company which will need to assess, for instance, how much capital is needed to finance any new development or expansion, or simply to finance next year's new business. A company will also be assessing how much free capital it has got. However, both the assessment of the capital base and the nature of the relationship between it and the volume of business need careful definition.

As for the first, various alternatives are listed in paragraph 6.5. I entirely agree with the authors that stock market valuations or sale prices are not appropriate. To my mind, method (*d*) based on 50% of average profits is rather arbitrary. Sometimes arbitrary rules have to be adopted in practice, but in principle they are more useful for a screening process than as a mandatory regulation.

This raises an interesting question about the design of supervision systems, the extent to which they should rely on scrutiny by outside people such as government officials, which implies a battery of screening tests with meshes of varying degrees of fineness. The alternative is self-supervision, where the company applies to itself the set of stated rules, giving a professional certificate that it has done so : the valuation regulations are an example of this. Method (*c*) I find particularly interesting. That suggestions and estimates should be obtained from an independent actuary leads me to wonder whether the company's own Appointed Actuary could be regarded as independent enough. He is after all working under strict guide-lines from the Faculty and Institute, and within the limits of regulations, the framework within which he can be independent, is in a situation which might otherwise be equivocal. But if, in spite of this, a second even more independent actuary is required, we would be getting

near to an entirely different system in which companies would be required to be actuarially audited by actuaries as independent from them as an auditor is.

Coming back to method (*c*), the assessment might be made by using a realistic basis without margins and allowing for the continuation of new business. If one omits future new business, the result in principle is similar to the proposed valuation regulations shorn of margins. The authors would place these margins in a separate compartment labelled " Capital Base ". This approach seems to me quite as logical as the method actually proposed in the regulations. which incorporates the capital base inter-margin in the valuation basis.

The authors comment in paragraph 6.9 that the actuary permits a company to write more business in relation to its capital base than the auditors of a manufacturing company would do. Here I agree with Mr. Wales. Surely the difference is not in the valuation method, but in the fact that the assets and liabilities of a life insurance company will match more closely than in the case of a manufacturing company raising a debenture. Even if the debenture is charged on specific assets, its service is being met out of trading profits, which is a situation corresponding to the issue of non-profit policies backed by 100% equity investment. An actuary faced with this position would undoubtedly want to set up substantial contingency reserves if indeed he was willing to sign a certificate at all.

All this makes me feel that there is much to be said for the traditional method which in one way or another relates the capital base to specific eventualities which have to be guarded against by margins in the various items of the technical basis. This can be done whether the margins are locked up in the reserve or brought out and shown as a separate item.

Finally, Sir, I welcome the paper, especially the prominence given to the idea of the capital base, and I look forward to more discussions on this topic.

Mr. A. D. Shedden, closing the discussion, said :—Messrs. Baker and Graham may or may not be pleased at the reception given to their paper this evening but I am sure they will both be happy at the vigour of the discussion it has provoked. In closing I shall deal only briefly with the earlier parts of the paper, on which there was I think fairly general agreement with the authors, and concentrate on parts 6 and 7 of the paper which deal with the problem of measuring the adequacy of a company's capital base or surplus. It was to this topic that most of the discussions were directed.

I too find myself in substantial agreement with the authors in their comments in parts 1 to 4 of the paper and in particular I would support their plea for raising the level of minimum capital required for a life assurance company and for the need to reinforce the role of the Appointed Actuary in exercising a continuing watch over the affairs of new and expanding companies. I am not sure, however, that it is necessary to go as far as to provide in legislation for this continuous monitoring and would not do away with the proposed quarterly review, at least for new companies and for those whose business appears to be of a volatile nature. On the other hand, there could be merit in a regulation obliging the management of a company to supply the Appointed Actuary with information regarding changes in investment and marketing plans, in order to enable a continuous monitoring to be effected in accordance with the professional guide-lines.

I agree with most of the authors' comments in part 5 of the paper regarding the need to provide adequately for mis-matching risks and for inflation of future expenses, etc. However, I would take issue with some

of the remarks on matching. For example, under present regulations the Appointed Actuary is *not* required to state in his annual certificate that the matching position is satisfactory but merely to state the extent to which, in choosing his valuation basis, he has had regard to the assets. As long as a company has the necessary surplus to withstand the effects of a change of interest on its assets and liabilities I do not think it matters if there is mis-matching. As the authors say, it is very difficult, if not impossible, for matching to be achieved. My criticism here is possibly not so much with what the authors really meant to say but with how they have said it. This may arise in part because they have concentrated on using the word "matching" rather than the more general word "immunisation" in desribing the interaction of assets with liabilities.

In part 6 of the paper the authors reiterate the need for a continuous watching brief on the position of a company, particularly one in which the business is expanding rapidly, and advocate that there should be some test of solvency margin which can be applied generally and continuously in order to give advance warning that a company is getting into difficulties. In brief, the test for an established company would be that it should have a "capital base" of at least 10% of its liabilities, capital base being defined as the average surplus distributed in the last 5 years times a factor in the region of 7. An alternative definition is given for a new life office and here I wonder whether the last word in paragraph 6.6 should be "less" rather than "greater". In proposing such a rule the authors appear to have virtually ignored the important points made earlier in the paper regarding matching of assets and liabilities, protection against exercise of options and inflation of expenses, etc. Nor is anything said about the nature of the reserves on which the test is to be conducted. As several speakers have remarked, it would appear that the more stringent these reserves are the worse off the company would appear to be in the light of the authors' test. Even the E.E.C. precedent, referred to in the paper and in the discussion, goes on to relate the capital base to a solvency margin which varies according to the type of liability, although it is none the less being strenuously opposed by the U.K. delegation as failing to take account of the particular problems concerning matching of assets and liabilities, peculiar to the U.K. and the Republic of Ireland.

In general, many of the E.E.C. Regulations, and our own proposed U.K. Regulations, suffer for having been framed in the context of particular classes of business and are not necessarily applicable to other classes. It follows that any such rules are of little use where a company's mix of business is unusual, especially where it is changing rapidly in size and content. To recommend that all established companies should satisfy a single test relating surplus distribution to liabilities is rather like testing the relative efficiency of companies' operations by comparing their expense ratios without having regard to composition of business or rate of growth; in this connection I was glad to hear Mr. Stewart's reservations about such a rule even though he admitted it would have advantages for ease of governmental supervision. Having listened to the discussion and heard all the arguments expressed against such a rule, I am tempted to paraphrase the authors and suggest that if an actuarial student were to recommend their approach in an examination paper I seriously doubt whether he would pass.

The vital point which an examination candidate would have to get down on paper in order to satisfy the examiners is that surplus in a life assurance company exists to finance new business and to cover the contingency that the premiums paid or payable on existing business will not be adequate, in the light of present or future investment, to cover the liabilities under

existing business. It is the level of contingency rather than the level of liability that is significant, as several speakers, including Mr. Harvey and Mr. Johnston, have pointed out. In paragraph 6.7 of the paper the authors have given us a clue as to how we should approach this problem. Here they state the unit-linked business without maturity or surrender guarantees would only be included in the liabilities to the extent of non-linked benefits. Obviously this is because the liability for the linked benefit is completely matched by corresponding assets. It would seem, however, but a step to proceed further with this approach and allow the deduction of *any* matching or immunising asset from the corresponding liability. In allowing assets and liabilities to more or less cancel each other out one must, of course, have regard to the potential effect of a change in interest rates and hold sufficient assets to cover any likely mis-matching risk. The amount of the capital base, or surplus, required in respect of the particular contract ends up as the difference between the valuation reserve sufficient to cover contingencies on a pessimistic basis and the reserve considered adequate on an expected or " hoped-for " basis. It would be coincidental only if this difference were to amount to 10% of either of these liabilities, whichever the authors had in mind, and so I would contend that any rule regarding solvency which looks only to the liabilities cannot in general be correct, even though it may work as a rule of thumb in some circumstances.

I can illustrate this thesis by referring to two recent papers presented to the Faculty, the first of which is Dr. Scott's paper on " Maturity Guarantees in Unit-Linked Life Assurance " which he referred to in his discussion. The first line of the second table, contained in paragraph 7.3 of this paper, reads as follows :

Term	Minimum proceeds	" Likely maximum " cost	expected cost
10	8·00	1·23	0·044

In the context of this paper these figures mean that for a 10-year contract with an annual premium of 1 the reserve required at the outset to cover the maturity guarantee on the assumption that the minimum proceeds could be 8, is 1·23 less the present value of any extra premiums charged for the guarantee. In contrast, the reserve required on the expected basis is 0·044 less the present value of extra premiums, and if these have been determined on the expected basis the expected reserve will be 0 and the surplus required at the outset to cover the maturity guarantee will be 1·23 − 0·044, i.e. 1·186. This is therefore the difference between the maximum likely (or pessimistic) reserve and the expected reserve. Thus the initial capital base or surplus required to finance such a policy is, on Dr. Scott's assumptions, more than 100% of the initial reserve ; the percentage of surplus relative to reserve for the whole contract will obviously vary throughout the term and would be 25% at the end of the term if the minimum proceeds were then available. Thus a 10% capital base guide-line for such liabilities would be much too low but on the other hand the percentage would be much smaller if the growth in capital values exceeded expectations and the reserve was in consequence much higher.

In determining the risk reserve under Dr. Scott's assumptions stochastic considerations are predominant. This would also be the case in determining the reserves for group term assurances, where the appropriate capital base for a given liability is a function of the number of lives and the variation and size of sum assured as well as the absolute amount of total sums assured.

A second example is taken from the figures given in Appendix 2 of my

own paper " A Practical Approach to Applying Immunisation Theory " and is designed to demonstrate the importance of the assets in assessing the real risk for which a capital base is necessary. The following table shows the variations in value of a perpetuity (V_A) and a single premium pure endowment for 1,000 due in 15 years (V_L).

Interest rate %	V_A	V_L	V_L/V_A
5	478·8	481·0	1·005
7	342·0	362·4	1·060*
9	266·0	274·5	1·032
11	217·6	209·0	0·960
13	184·2	159·9	0·868
15	159·6	122·9	0·770

*Maximum value.

$$\text{Immunising premium at } 15\% = \frac{122{\cdot}9 \times 1{\cdot}060}{0{\cdot}770} = 169{\cdot}2.$$

If we suppose that the pure endowment is bought when the rate of interest is 15% we see that in applying immunisation theory the worst possible situation to allow for in setting up reserves is an immediate fall from 15% interest to 7% interest and the pessimistic reserve required to be set up at the outset is therefore equal to the immunising premium of 169·2, implying a valuation rate of interest of just under 13%. If the premium for the pure endowment were calculated assuming 13% interest it would amount to 159·9 and the surplus required at the outset to cover the contingency of a fall in the interest rate would only be the difference between the immunising reserve of 169·2 and this premium, i.e. 9·3 or 5·5% of the reserve. This implies that a 10% level of surplus in this case might be unnecessarily stringent.

This second example shows clearly that the amount of surplus required to cover a contingency is generally a function both of the premium basis and the assets bought with the premiums, although if stronger reserves were set up than strictly were required there would be a correspondingly larger strain on surplus. Moreover, it is possible for the premium basis to be more stringent than the maximum likely reserve basis in the context of the particular assets bought, so that instead of the contract requiring some surplus to support it, it in fact becomes a source of surplus to the company. These examples, and those given by other speakers, notably Mr. Wales, demonstrate that not only is the ratio of capital base to liabilities extremely variable but the capital base needed does not seem to bear any necessary relation to the amount of surplus or profits being distributed. If anything, profits paid out are a reflection of past surplus needs rather than of present surplus needs and so there seems to me to be a fundamental objection to determining the capital base in terms of the amounts of profits distributed, especially if the company's business is changing or growing rapidly. It is significant to remember that in the context of today's rates of inflation even established companies are growing rapidly and so are running into many of the problems formerly confined to young companies.

Since the discussion appears to me to have mainly come out against the authors' proposition in paragraph 6.10 that capital base should be defined in regulations and the actuary's certificate modified accordingly, it would seem that support should not be given to the authors' conclusion (*a*) and that part of conclusion (*b*) that follows from (*a*). I think most of those discussing the paper could support conclusions (*c*), (*d*) and (*e*). Indeed I had thought that (*d*) was the intent of the proposed Valuation Regulations

anyway. For my own part, while accepting that conclusions (*f*) and (*g*) are desirable in practice I see no real need to make them obligatory provided the actuary can demonstrate that enough surplus is available to cover any mis-matching situation. As regards paragraph 7.4, that is, as the authors suggest, a separate subject but I have sympathy with the view that the actuary should be able to draw attention to bonus expectations in his valuations. I might add that this would be an incidental feature of a published bonus reserve valuation, if such a valuation were permitted under the regulations.

We are indeed grateful to the authors for giving us the opportunity, through their paper, to discuss the general problem of solvency valuations and for focusing our attention on the importance of a sufficient level of capital in conducting life assurance business. However much we may disagree on how one measures capital base or how much is required in terms of the liabilities I think we are all agreed on the importance of determining capital base particularly, as Mr. Duval pointed out, in the context of insuring that companies do not attempt to undertake more business than they can absorb. However, I feel that we should avoid cluttering up the valuation regulations with specific rules, such as the authors' suggestion, but concentrate on agreeing on general principles. It is for the actuarial profession to examine particular aspects of these principles as they apply in specific situations and to various classes of business, and to attempt to achieve a consensus of professional opinion as to the proper approach in each case. We are some way from achieving this, as the discussion tonight and on the previous occasions when we have discussed valuation topics all too clearly shows. This, however, does nothing to detract from the value of the authors' paper, which takes us a step nearer towards solving the problem of avoiding failures amongst life assurance companies.

Mr. N. S. Graham, replying to the discussion, said:—I have attended Faculty meetings on three previous occasions and I have always enjoyed the warmest hospitality in these delightful surroundings. It is therefore an honour and a pleasure to present this paper with my colleague Tony Baker.

Your President has told me that we shall have the opportunity of replying in writing when we have studied the transcript of the discussion. I therefore propose to keep these closing remarks very brief.

Mr. Baker and I are grateful to the speakers for concentrating on the main theme of the paper. There has been some criticism that our approach is subjective and unscientific but, as several speakers have said, there cannot be an absolute standard of insolvency ; the best we can hope for is to place companies in a probable order of solvency. Mr. Wales considers that we have not done sufficient research, but I suggest that it is preferable for our ideas to be ventilated at this stage for three reasons. Further research would have delayed the paper on a highly topical subject during a period when there may be further company failures. Secondly, the determination of solvency is not an exact science which yields to pure research. Thirdly, research would have been fruitless if the basic ideas were unacceptable. As Mr. Plymen has said, a whole new paper could be written on the variety of multiples which should apply to different classes of business.

We are grateful to Mr. Stewart for expressing our rule in the more direct statement that life business should generate annual profits of at least $1\frac{1}{2}\%$ of the liability. Expressed in this way, it certainly seems harsh for immediate annuity business, which presents no matching problems.

In closing, I should like to endorse Mr. Johnston's views on the importance on the capital required for next year's new business. Personal experience of overseas business in territories with a statutory valuation basis has emphasised the need to restrict expansion in accordance with the capital available. Control based solely upon a valuation of current assets and liabilities, however well matched, is doomed to failure.

The President (Mr. M. D. Thornton):—When I first read this paper I was reminded of a matter which caused concern to the Board of Trade last century. Shipowners then in search of greater profits used to overload their ships. If the weather was good they made port and the voyage was profitable. However, if the weather turned bad no amount of skill on the part of Captain and crew could save the ship from disaster. For many years attention was directed to what the Captain could have done that might have saved the ship. One man saw farther. Samuel Plimsoll, the Member of Parliament for Derby, kept urging that overloading was the prime cause of the trouble and in the end his views were accepted. Now every merchant ship has a Plimsoll line.

These overloaded ships were called coffin ships. There are no coffin insurance companies, but one or two recently established companies have gone on the rocks. It is possible for an insurance company, by transacting too much business relative to its capital base, to get into such an overloaded state that, if the economic conditions turn stormy, nothing the actuary can do can save it from disaster. What we have in the paper before us this afternoon is a proposal for a Baker-Graham line, which will show up this overloading just as the Plimsoll line shows up an overloaded ship.

As I sense the feeling of the meeting, very few reject altogether the idea of such a line, the great majority feel that there should be a line, but while some feel further examination is required before we can settle on the correct place to draw it, others feel that the important thing is to get the line drawn, the Baker-Graham line, and consider adjustments to it in the light of experience. What I do sense very clearly however is that all of us agree on the importance of the subject. The first step, some say, is the only one that counts. This paper is such a step and with the discussion it has inspired it marks an important contribution to the direction of thought on the solvency of life offices. I have much pleasure, therefore, in calling upon you all to join me in a most cordial vote of thanks to the authors.

The authors subsequently wrote:—The draft statutory valuation regulations follow the traditional approach of deeming a company insolvent at a valuation date if the value of future liabilities exceeds that of the assets, although in our view the most we can hope for is to put companies in probable order of insolvency. Our theme, apparently missed by several speakers, is the prevention of *future* insolvency, at any and every date that lies ahead. We believe that it is essential to place a continuous restriction on new business levels, and the discussion endorses this view. Criticism centred on the method of achieving this aim, and this is to be expected because there is no perfect answer which is both accurate and easy to apply. We are again only dealing in probabilities with a view to highlighting companies requiring further investigation.

Our own preferred approach for present solvency would be to compare market value of assets with liabilities calculated on a gross premium basis (laid down by the Department of Trade at each point of time according to investment conditions and inflation) and allowing for future bonuses at a stipulated proportion (say 60%) of the higher of current bonus rates or

those quoted on new quotations. For future solvency the capital base would then be calculated in the same way except that there would be no liability for future bonus. However, it seems inevitable that we will follow most overseas countries in having a net premium basis for statutory valuation and we have accepted this constraint. To enable the Department of Trade to place companies in probable order of insolvency we believe that liabilities in the Returns should be calculated on the statutory minimum basis, and not a stronger one determined by the actuary.

For *future* insolvency, we have introduced the notion of capital base, which is really the current surplus carried forward plus the value of future surplus earned by the company as a *going concern*. For simplicity we ignored surplus carried forward (which is generally small) and assumed future annual surplus at the rate distributed over the past few years. As many speakers pointed out, this could have the unfortunate effect of encouraging actuaries to distribute more surplus when they should be distributing less. This objection could be overcome by determining the capital base as an amount equal to the surplus carried forward plus 7 times the annual rate of surplus earned over the previous valuation period, all on the statutory minimum basis—a figure which would be readily available and consistent between companies. As stated in the paper, there would be a minimum of paid-up share capital less new business strain to date. It is of interest to note that difficulties invariably arise whenever one seeks to permit any degree of actuarial freedom within the confines of a statutory control system.

We do not accept the criticism that the multiplier should vary according to class of business. In a going concern, we want the value of a perpetuity, although it may be argued that 7 is unduly conservative. We do not want the average outstanding term of present policies on a closed fund basis. Mr. Wales would surely hope that his one-year bonds would be replaced by something else, although we admit that a company is less stable if its policies have a short outstanding term. Mr. Seymour preferred to add back new business strain to surplus earned, but again we think that this would only be appropriate on a closed fund basis.

As Mr. Stewart says, our proposition that the capital base should exceed a solvency margin equal to 10% of the liabilities corresponds to the E.E.C. proposal for main classes of 4% of liabilities plus 0·3% of capital sum at risk. We accept that both of these measures are somewhat crude, although further research may lead to useful refinement—they are crude largely because prevention of future insolvencies cannot by its very nature be an exact science. Mr. Shedden's concept of risk premium equal to the difference in reserves on pessimistic and actual valuation bases, taking into account the type of assets, would seem a reasonable approach if it can be expressed in the form of a simple formula for each class of policy.

We emphasise again that the aim is to provide advance warning of future insolvency so that appropriate action can be taken in advance. In these circumstances our suggestion of an absolute standard to be met in the published returns may be too severe and might result in adverse publicity which is undeserved. It might be sufficient for merely the ratio of capital base to " solvency margin " to be quoted to the Department of Trade, who would initiate further enquiries where necessary. These could well involve the emerging sum method advocated by Mr. Smart, but we consider it to be much too cumbersome for all companies to operate in the first instance. We also suggest that such calculations should take future new business into account.

In inflationary times, new business increases rapidly, as indeed it must

to cover overhead expenses. This means that old established offices will increasingly encounter these problems, which in the past have only been associated with new offices, so that surveillance by the Department of Trade will become much more onerous. As Mr. Smart said, expansion in itself if not a cause of insolvency, but it does make an office more vulnerable to adverse conditions. Using the President's analogy, an overloaded ship is ill-equipped to weather storms.