subject is an important component of post-graduate and/or post-qualifying training.

Traditionally smoothing formulae have only been used for graduation. An extension of such techniques leads to the modelling and forecasting of Time Series. The actuarial literature of recent years abounds with examples of the use of Box-Jenkins models, particularly for investment problems. The presence of elementary time series modelling in the statistics syllabus and its use in research in one area suggests that it is an important subject for more detailed examination coverage, and possibly fruitful as a research method in other areas, particularly general insurance.

The development of Generalized Linear Models and their estimation using the GLIM software package is described. Several examples of the use of these models in general and life insurance are given. The subject is seen as an essential part of post-examination training. However the key approaches to GLIM modelling, e.g. the use of log transformations, likelihood ratio testing, etc., could be introduced into the current examination without major disruption.

Bayesian Inference has been neglected by the majority of actuaries. The development and use of Credibility or Experience Rating in North America and Continental Europe has shown that Empirical Bayes Methods can provide a productive approach to problems in Risk Theory. Unfortunately the mathematical sophistication required for a full treatment of the topic makes it unsuitable as a major component of examinations and probably only accessible to a limited number of actuaries in a post-qualifying course.

The paper concludes with an extensive bibliographic note, which provides a guide to the more recent texts in all subject areas. Some papers which give examples of the use of the new techniques in actuarial research are also cited.

PARTNERSHIP PENSION ARRANGEMENTS

BY GEOFFREY BERNSTEIN

(*Synopsis of a paper presented to the Society on 21 January 1986*)

THIS paper outlines some of the recent developments in the field of planning partnership pensions. The word 'partner' refers to one of a group of people working together in an unincorporated body. They are taxed as 'self-employed'. The legislation governing their pension provision is quite different from that of employees taxed under Schedule E. The paper focuses particularly on self-invested funds available through insurance companies or through a 'captive or private' friendly society.

Pension planning is an integral part of overall partnership planning which includes:

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(i) Getting clients' work done,
(ii) Raising capital,
(iii) Reducing the immediate tax bill,
(iv) Securing the partnership succession.

In solving the partners' pension problem, the consultant can contribute to the solution of other financial problems, including (ii), (iii) and possibly (iv) above. In essence, financial planning for a partnership is an extension of personal financial planning. The appraisal of the current position and the setting of objectives for the future are discussed. The advantages and disadvantages of the various options available to reconcile these two are described. The special role of the actuary in assessing the value of the current and proposed benefits on a realistic and consistent basis is discussed.

Retirement Annuity Contracts approved under § 226 of the Taxes Act form the basis of insured pension schemes. The paper describes three aspects of these policies which may be of particular interest to actuaries:

(i) the analysis of policy charges,
(ii) the appraisal of investment performance,
(iii) loanbacks.

The insurance companies' expense loading comes in the form of charges deducted from premiums and the funds under management. These charges, averaging 20 to 25% of each premium, are significant in evaluating the returns from policies. Choosing a company with only average investment performance, but with a lower level of charges than other companies, has the potential for dramatically improving the overall return. Charges can be reduced by (i) using a series of single premium policies rather than a regular premium one, (ii) using the partnership's purchasing power to obtain 'quantity discounts'.

Consistently good long-term investment performance will dominate any charging structure, but such returns are difficult to achieve over a period of 20 or more years and the policyholder faces the difficulty of determining which company will do well in the future.

Choosing an investment manager or life office to look after your money may be more difficult than choosing the investments. The choice is bewildering and any simple rule of thumb methods for choosing a suitable investment medium would certainly by very useful. One of the more frequently quoted observations is that unit linked funds tend to do better in the early years, soon after they are set up, than after they have been established for some time. Calculations in the paper indicate that this may, indeed, be true for retirement annuity funds, in particular Managed and U.K. Equity and Fixed Interest Funds, although the effect is quite small. There are many behavioural models postulated to explain this phenomenon, but it is not possible to gather data which support a single explanation. To base an investment strategy on an unexplained and perhaps irreproducible effect cannot be regarded as a sound policy.

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Nearly all retirement annuity policies are packaged to include some form of loanback arrangement. Legislation and revenue practice prevents the use of the annuity policy as security for any loan and the granting of loans at non-commercial rates. Loans without restriction as to use will usually require security, whilst unsecured loans will have restricted use and usually have a maximum term of 25 years. In either case such loans do not easily fulfil the capital needs of the partnership or of individual partners. The paper discusses the forms of possible loans and their drawbacks.

The capital requirements of a partnership can often be more easily met by self-invested and/or administered schemes. Provided that suitable safeguards can be devised, many partnerships must wonder why their retirement annuity funds should not be used to capitalize their own businesses rather than being invested out of their reach. It would be quite outside the spirit and scope of the legislation for annuity funds to be employed directly in the practice. Nevertheless, these maybe perfectly sound investments which might also benefit the partners' business indirectly. In particular, for the annuity fund to purchase property which can be leased to the partnership on commercial terms may be an excellent, secure investment. The paper discusses in detail the advantages of such an arrangement.

An insurance company self-invested scheme can be a half-way house between an insured and a self-administered scheme. A number of companies are now prepared to set up a segregated retirement annuity fund for one or more individual policyholders, for example, the partners in one firm. In principle, the insurance company hands over the investment control of this fund to the policyholders. In practice, it is somewhat more complicated than that. The company places restrictions on the self-investment policy so that its overall investment strategy is not adversely effected by activity in the segregated fund. The form and implications of these restrictions are discussed.

An extremely intriguing and quite practical alternative proposition is for the parties to set up their own 'private' friendly society. The society can transact the partners' retirement annuity business in the usual way and with all of the usual tax privileges. The annuity contracts are, in all important respects such as limits on qualifying premiums and tax-free lump sums at retirement, identical to those issued by insurance companies. The friendly society's investments are not subject to tax, provided the necessary approvals can be obtained.

This arrangement enables the partners to have control through the society of their investments. The relationship is even more direct than investment through an insurance company's segregated fund. The society can invest in property which can be leased to the partnership. It can also provide up to 100% loanbacks on a secured basis. At the same time, the costs can be much lower than for an insurance company's segregated fund. The establishment, administration and investment policy of such a friendly society are described in detail.

Whilst the main themes of the paper are those already described, some alternative methods, worthy of consideration, are outlined.

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Some partnerships have found it worthwhile to set up limited companies, owned by the partners, to conduct part of their business. For example, a firm of accountants might set up a management consultancy company. The company will then charge its clients for its work and may well employ various members of the partnership. Their renumeration from the company will be taxable under Schedule E. It will therefore be possible for the company to establish a scheme approved under the Finance Act 1970 to provide pension benefits for those partners who are employed by it. Such an arrangement allows the partners to take advantage of the less severe restrictions on contributions, and constraints on investment policy allowed to these schemes, compared to the §226 pension arrangements. Possible optimum employment arrangements, i.e. partner *v.* employee, are discussed.

The possibility of using §226(5) of the Taxes Act to establish a trust fund is mentioned. It is noted that virtually no such funds exist at present.

It is, of course, open to the remaining partners simply to provide an annuity to their retiring colleagues out of the practice's income on a year-to-year basis. The disadvantages of such a 'pay as you go' scheme are discussed.

Successive governments have sought to encourage individuals' saving for retirement since it is clearly desirable that they should not be a burden on the State in their old age. In the meantime their savings will form a useful capital base for the country. The Government's chosen method has been to provide tax incentives for savings schemes which satisfy certain restrictions laid down in the various Acts. These are aimed at limiting the dates at which savers can withdraw their savings to around their retirement age and ensuring that the bulk of the savings have to be withdrawn as life annuities. In addition, the savings must be managed by an insurance company or friendly society. Possible changes that would make this legislation less restrictive yet still ensure that the stated objectives are achieved are discussed.

The paper concludes with some practical guidelines crystallized from the earlier discussion.

PROMISES, PROMISES:
The Myth and Reality of Life Office Quotations

BY M. IQBAL AND E. SHORT

(*A synopsis of a paper presented to the Society on 18 February 1986*)

THE Government's success in reducing inflation to around 5% and the long term rate of interest to around 11% and the likelihood that the days of high interest rates are unlikely to return in the near future has put the current rates of bonus under severe strain. Inevitably they must fall at some stage. This poses an urgent

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