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ACTUARIAL SCIENCE IN 19th CENTURY AMERICA

by James H. Cassedy

Editor's Note: Dr. Cassedy is Historian with the History of Medicine Division of the National Library of Medicine, part of the National Institutes of Health. He is the author of "Demography in Early America: Beginnings of the Statistical Mind 1600-1800", to be published by the Harvard University Press this fall. His researches uncovered some of the early history of actuarial science and we are grateful to Dr. Cassedy for sharing his interesting findings with us in this article.

The beginnings of actuarial science in the United States were only pale reflections of the vigorous European developments in this field during the eighteenth century. Unlike Europe and Great Britain, America was not then an attractive locale for commercial life insurance enterprises; in fact, virtually none came into being until after 1800. Until the nineteenth century no American had the title of actuary, and Americans were not yet in a position to contribute much to the mathematical theory upon which actuarial science depends. Nevertheless, some small life insurance and annuities societies were launched, and each had an employee who did actuarial work, however elementary.

Much of the early actuarial work both in Great Britain and in the United States was done by clergymen. As a group they were frequently familiar with scientific and mathematical writings, and in addition they had a closer acquaintance with local parish registers and other vital records than had most people. They also had incentive to start life insurance societies since these were intended to serve charitable ends. British preachers who pioneered in scientific life insur-

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New Editors

We are glad to announce the following appointments to the Editorial Staff of *The Actuary*: Peter L. Hutchings, Frederic Seltzer, and Edward H. Wells.

With more editors perhaps we will be better able to handle the increasing volume of contributions.

BOOK REVIEW

Paul A. Campbell, *The Variable Annuity, Its Development, Its Environment and Its Future*, pp. 71, Connecticut General Life Insurance Company, Hartford, Connecticut, 1969.

by Thomas Mitchell

This attractively produced booklet will serve as a very good introduction to variable annuities for all approaching the subject from a general insurance background. The copious references included should also make it of use to the actuary dealing with variable annuities.

The author introduces the general concept of the variable annuity through a discussion of retirement security and inflation. Final-pay plans and cost-of-living plans are discussed as alternatives to variable annuities for pension plans. It is refreshing to note that (although the author "admits" to being basically pro-variable annuity) both the advantages and disadvantages of the variable annuity are well discussed.

The history of variable annuities in the United States is traced from the viewpoints of the philosophical battle among insurers, the struggle for the savings dollar, and the experience of the frontrunners in the field.

The "spectre of variable annuity regulation" is rightly seen by the author as the most imposing hurdle for development of the field. A brief, but valuable, description of federal regulation of variable annuities is followed by an inter-

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SOCIAL SECURITY IN THE UNITED KINGDOM

by F. C. Sibbald

Editor's Note: We are greatly indebted to Mr. Sibbald for this report on the new National Pensions proposals now under consideration in the United Kingdom.

The British Government has recently issued a "White Paper" entitled *National Superannuation and Social Insurance*, setting out proposals for a far reaching alteration in national pensions, in order to "stimulate public comment and debate and to serve as a basis of consultation". These consultations are now proceeding with a view to legislation during the next session of Parliament.

The existing scheme, introduced in 1948, provides flat rate benefits for flat rate contributions. Over the years, this has become inadequate for a variety of reasons, and an earnings-related benefit with earnings-related contributions was added in 1961, but its modest scale and slow maturity did little to solve the problem. The flat rate scheme suffered from the need to keep the contribution within the capacity of the lowest paid contributors. Accordingly, it has become necessary to grant supplementary benefits on a "means tested" basis to those in need.

The new scheme proposed is related to earnings and provides for contributions by employed persons of 4¾% of earnings up to a maximum of 1½ times national average earnings (about £33 per week or £1700 per annum). Employers will pay 4½% of payroll, with no earnings ceiling. There will also be a contribution from general taxation of 18% of employers' and employees' contributions. Pensions commence at age 65 for men and 60 for women and amount to 60% of his or her earnings

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up to *half* national average earnings plus 25% of the remainder up to the ceiling of 1½ times national average earnings. Thus a person's entitlement is based on earnings throughout working life.

However, to take account of changes in the purchasing power of money, it is proposed firstly, that pension rates will be reviewed every second year and increased to compensate for rises in prices, and secondly, that an individual's earnings shall be "revalued" from time to time in line with changes in national average earnings to take account of general living standards.

Full maturity is achieved after 20 years, with transitional pension rates based on proportions of the old level and the new, according to the number of years of "new" contributions paid.

The scheme involves a redistribution of income, from the young to the old, from the higher paid to the lower paid, and from men to women (since their contributions and benefits are calculated on the same basis, but women receive their pensions at age 60, and live longer).

Pension Funds

There is, however, in Britain a very highly developed system of occupational pension funds, self-administered in the case of some of the largest companies, but many others run by life assurance companies on behalf of employers. These vary in the benefits provided and can be tailored to meet the conditions of the particular employment. A good pension scheme can provide a pension of two-thirds of final salary. It is estimated that in 1967 the additions to such funds provided no less than two-fifths of all net personal savings and thus play a vital part in the development of the economy. It is therefore unthinkable that such a structure should be gravely impaired by the effect of an unfunded "pay-as-you-go" national scheme.

The government has recognized this situation and the White Paper pays tribute to the highly successful pioneering efforts of the occupational pension funds and envisages a continuing partnership between the State and the occupational schemes. Accordingly, the White Paper provides for an element of "contracting out" of part of the State contribution and benefit for those who have an adequate occupational pension scheme which will provide "preservation" rights on change of employment. The terms for contracting-out were not stated in the White Paper but are one of the matters now being negotiated between the departments concerned and interested parties, including the self-administered funds and the Life Assurance offices. □

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Book Review

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esting discussion of the influence of this regulation on corporate organization and product design.

The description of state regulation has two misinterpretations of the Model Variable Annuity Regulations adopted by the NAIC. The Model proposes minimum grace, reinstatement, and nonforfeiture provisions appropriate to variable annuities *only* where these provisions are required for fixed deferred annuity contracts in the state. Also, the Model imposes a limit (a-49) on the mortality table used for determining annuity benefits only where mortality experience is *not* guaranteed by the company.

The author gives considerable material on product design, to which I will add a few comments. He discusses whether there should be distinct investment pools for retired lives and active lives. This has generally been decided in favor of only one pool.

In setting the Assumed Interest Rate (AIR), there are considerations involved other than the likely long-term performance of the stock market, such as state regulation of the AIR and competition with fixed-dollar annuities.

Of necessity, the product design chapter does not cover the many variations among products offered by different companies. The author describes current general practice for the most part. In his discussion of the combination of fixed and variable annuity contracts, it should be pointed out that most such contracts allow changing the percentage allocation of premiums between the fixed and variable portions from time to time. However, on many contracts the transfer of funds already allocated to a given accumulation is limited because of fear of investment selection on the fixed-dollar segment.

It should also be added that the SEC is now asking for daily determination of unit values. This will require adjustment by the many companies now using the weekly determination described by Mr. Campbell.

Valuation of Liabilities

Mr. Campbell also discusses the valuation of liabilities for variable annuities. He properly identifies the problems involved, although some aspects are more complex than he indicates.

The book contains a valuable analysis of the large potential markets for variable annuities, to which I would add two comments. Companies whose life insurance contracts contain an Annuity Option to purchase single premium annuities at favorable rates with contract proceeds will, in effect, be offering a variable settlement option on all of their current insurance portfolio if they adopt a single premium immediate variable annuity product. The other significant development has been the introduction of flexible premium payment requirements with most periodic premium deferred individual variable annuities. This will be particularly valuable in various tax-qualified situations.

The author is to be congratulated on making a substantial contribution to the literature on variable annuities. The booklet will be helpful to many people, perhaps most of all to the students, since portions of the book have been selected as reading material for Part 9I. □