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PENSIONS

Dan M. McGill, *Fundamentals of Private Pensions*, Third Edition, published for the Pension Research Council by Richard D. Irwin, Inc., Homewood, Illinois 60430, 1975, pp. 502, \$10.95.

by Donald S. Grubbs, Jr.

The Third Edition of *Fundamentals of Private Pensions* by Dr. Dan M. McGill is the most comprehensive text yet on the subject of pension plans. The Second Edition of *Fundamentals* has been on the syllabus of the Society of Actuaries since its publication in 1965. The Third Edition is not merely an updating of the prior edition, but an almost entire rewriting. The author estimates that no more than 20% of the material in the Second Edition is unchanged. The new Edition covers the wide variety of developments within the last 10 years, as well as the sweeping changes brought about by the passage of ERISA and also shows a deeper exploration of many of the fundamentals of private pensions.

The timing of a new basic text on pension plans presented a dilemma. The developments of the last 10 years, even without ERISA, made a new publication most desirable. The passage of ERISA made the Second Edition of *Fundamentals* and all other texts on pensions obsolete, so a new text was urgently needed. The required regulations were not yet published and further in many respects the exact interpretation of the law is still obscure. From one vantage point it would have been better to wait until the Regulations are published so that the text could have encompassed a complete and accurate description of the application of all aspects of the new law. But the publication of regulations may continue over a long period and the preparation of the text could not await the final edict.

The author has provided a full explanation of the new law and interpretations which seemed likely to him, noting that the interpretations of the law were uncertain at the time of writing. Future regulations will probably prove that some of the author's interpretations are not accepted but even with such minor flaws I believe that two years from now this text will be considered an excellent explanation of ERISA.

The chapter on integration with social security deals both with the purposes

INTEREST RATES AND SALARY

by Herb

I am surprised by the comments of Barnet N. Berin on the above subject as printed in *The Actuary* for April, 1975. Of course, if a specified number is subject to two different rates of change, the two rates can be combined into one rate. Using Mr. Berin's figures, the relationship of a growth rate of 8% to a growth rate of 5% is 1.08 divided by 1.05; and not 8 divided by 5. The correct answer is 1.02857; and not 1.6 as indicated by Mr. Berin.

For a Pension Plan subject to an annual increase of 5% for inflation and valued with annual interest rate of 8%, (both rates compounded annually), the

present value of a salary of S_{x+n} equals $(S_x)(1.02857)^{-n}$

The valuation can be made with current salaries without an annual increase rate for the salary and with an interest rate of 2.857%.

This can be illustrated for a pure endowment payable (n) years after Age x.

$$(l_x \cdot S_x)({}_{x+n}PE_x) = l_{x+n} \cdot S_{x+n} (1+i)^{-n}$$

$$S_{x+n} = S_x (1+r)^n$$

$$(1+j) = (1+i) \div (1+r)$$

Substituting and dividing by $l_{x+n} S_x$

$${}_{x+n}PE_x = (l_{x+n} \div l_x) (1+j)^{-n}$$

is the present value at Age x per dollar of S_x of S_{x+n} dollars payable at Age $x + n$.

An annuity for the salaries from Age x to Age y is a sum of a series of pure endowments. Each pure endowment is valued with a rate of j and a constant annual rate of increase in salary (such as 5%) is not used. The annual rate j is below the annual rate of return for investments as indicated previously.

in plan design and with the regulatory requirements of the Internal Revenue Service. It presents both an overall view of the integration requirements and a careful explanation of the details and also explores the history and philosophy of the development of the regulations.

Chapter 11, "Adjustment of Pensions for Inflation and Productivity Gains", faces the problem of providing an adequate retirement income in an inflationary period, with costs the employer can afford to pay. It deals both with having the initial amount of pension appropriately related to the salary at the time of retirement and with adjustments after retirement. Equity variable annuities, cost-of-living adjustments, wage-indexed benefits, other formula increases and ad hoc adjustments are discussed. There is also an interesting presentation on *répartition*, an approach developed in France to deal with inflation. This sys-

tem, which covers about 2/3rds of French workers, is a sophisticated modification of the pay-as-you-go approach, too complex to be described in this brief review. While not immediately applicable to plans in the United States and Canada, future run-away inflation may well force us to explore such radical approaches to providing pensions.

The wide variety of funding instruments with their strengths and weaknesses and their implications for current and future employer costs and for benefit security are objectively and carefully explored.

Of particular interest to actuaries will be the six chapters on actuarial considerations representing a very substantial expansion in the actuarial material, compared to the prior text. The presentation is made in terms of concepts rather than in formulas, and simple numerical illustrations are provided. These sections will

CAUSES IN PENSION VALUATIONS

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A valuation rate of 4% for j can represent an infinite number of rates for investment returns and for inflationary-caused compensation increases. The only restriction is that: $1.04 = (1 + i) \div (1 + r)$. The following table contains examples.

Net Factor	Investment Factor	Inflation Factor
$(1 + j)$	$(1 + i)$	$(1 + r)$
1.040	1.090	1.048
1.040	1.080	1.038
1.040	1.070	1.029
1.040	1.050	1.010
1.040	1.040	1.000

I suggest that a study of these factors for the last 50 years will demonstrate that the rate j is more stable and more easily projected than either of the other two factors. I remember a paper I read many years ago in an English publication on the subject of the basic interest rate. This rate included no allowance for either inflation or the loss of capital. I think the indicated rate was between 2½% and 3% per year compounded annually.

In substance, the average investor is satisfied with a 3% return if the security of his loan is absolutely safe from depreciation by inflation or by capital loss. If there is a risk of loss because of possible capital loss or because of inflation, the average investor will demand a higher return to justify taking the additional risk. Assume an investment as safe from capital loss as is possible but subject to inflation loss. The rate of return on such an investment (such as U.S. Government bonds) will in the long run average to be $(1 + i) = (1.03) (1 + r)$ with r representing the average rate for inflation.

This indicates that the 3% rate (or the j rate) without inflationary salary increases provides a better base than the use of i and r rates in determining present values. These present values are expressed in current dollars and they are for the benefits to be paid and for the contributions to be collected in the future for a Pension Plan. □

provide a good introduction to the actuary or actuarial student just entering the pension actuarial field as well as a stimulating review for the well-established veteran. Further, since the presentation does not presume prior knowledge a reading of these sections should help the non-actuary to understand our work better.

A chapter on actuarial cost factors explores population decrements (death, disability, retirement, and other terminations) and increments (new hires), salary scales, retirement ages, interest assumptions, and expenses with some thoroughness. This includes concise but incisive paragraphs on select and ultimate termination rates, mortality improvement, the components of salary increases, the interrelation of inflation assumptions with respect to investment returns, salary increases and cost-of-liv-

ing adjustments, and a discussion of the concepts of immature, mature and over-mature populations.

Actuarial terminology presents problems because there is no uniformity in the terms used within the profession. To help solve this problem, the author clearly defines the terminology he uses and explains the relation of alternative terms to the particular set he uses. A uniform terminology is badly needed.

Not only do actuaries differ in terminology, they differ significantly in their concepts of what methods should be used and how. Some actuaries will disagree with various aspects of the presentation on actuarial cost methods, but all will find it carefully and well presented even in the aspects they disagree with. The author divides the accrued liability between the normal cost liability and supplemental cost liability. The annual amortization of the supplemental cost liability

is called the supplemental cost and the total of the normal cost and supplemental cost are designated the annual cost of the plan. Under the accrued benefit cost method, after an explanation of the conventional accrued benefit cost method, several modifications are presented on which actuaries opinions differ.

A chapter on pension cost illustrations and forecasts provides illustrations of the various actuarial cost methods on both the conventional closed group method and forecasts using open group valuation techniques.

A separate chapter deals with the valuation of ancillary benefits, including vesting for active and terminated vested participants, pre-retirement and post-retirement death benefits, disability benefits for active and disabled participants, the valuation of employee contributions, and special considerations for small plans. This chapter presents a variety of possible approaches and suggestions for the practicing actuary.

A chapter on funding views the objectives and philosophy, the statutory funding standards, and the effects of various actuarial methods upon the pattern of funding.

A final chapter on plan termination insurance reflects the author's in-depth knowledge of this subject. Dr. McGill was author of a pre-ERISA book on pension termination insurance, and currently serves as Chairman of the Advisory Committee of the Pension Benefit Guaranty Corporation. □

Social Security Note

Dual Benefit Windfalls For Active Railroad Employees, Actuarial Note No. 5-75, Railroad Retirement Board, Chicago, Ill., August 1975, pp. 6.

This note discusses changes in the Railroad Retirement Act concerning dual beneficiaries; that is, those individuals who would be eligible for benefits under both the Railroad Retirement and the Social Security systems. Discussion of the eligibility provisions of the Railroad Retirement Act of 1974 for windfall benefits is included and an example showing the windfalls is computed. Estimates are given of the number of persons now eligible for windfall benefits by age group and of the amounts payable from 1975-2034.

For free copies write to the U.S. Railroad Retirement Board, 844 Rush Street, Chicago, Ill. 60611. □