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BOOK REVIEWS AND NOTICES*

Chester Wallace Jordan, Jr., *Society of Actuaries' Textbook on Life Contingencies* (2d ed.), pp. 401, Society of Actuaries, Chicago, Ill., 1967.

Professor Jordan has outdone himself; he has improved an already outstanding textbook. The second edition is a worthy successor to the original.

The over-all format and the content are essentially the same as the first edition, and readers are referred to the review by the late Harry Gershenson that appeared in Volume IV of the *Transactions* (p. 836). There are many significant changes, however, including the addition of a chapter on pension plans and disability benefits.

Generally, changes in wording have been made throughout to clarify the exposition. In a number of instances improvements have been made in the mathematical demonstrations. The exercise sets at the end of each chapter have been revised and expanded. Students wishing to delve further into particular aspects will be gratified to find a vastly expanded bibliography and a section at the end of each chapter citing the principal sources for various sections of the material covered.

Some of the specific changes are worth mentioning. Thus the section in chapter i dealing with the measurement of mortality at fractional ages has been broadened. Instead of limiting itself to the assumption of a uniform distribution of deaths, the revised edition adds a brief discussion of the effect of assuming that the reciprocal of l_{x+t} is a linear function and the resulting Balducci hypothesis. The respective implications of each assumption are developed further in the exercises.

The treatment of installment and apportionable premiums in chapter iv and reserves in chapter v has been modified to place somewhat less reliance on general reasoning and somewhat more on mathematics. Another significant change in chapter v is an improved and clearer introductory section on the nature of a reserve. The reserve chapter also develops the useful fact that the reserve can be expressed as the accumulation of the net premiums with interest minus the accumulation at interest of the cost of insurance based upon the net amount of risk.

Chapter vi ("The Expense Factor") has a number of important changes. The section on asset shares has been deleted because the material covered is more properly a subject for the later examinations. The treatment of the commissioners reserve valuation method, which in the first edition was somewhat inaccurate and confusing, has been rewritten and clarified. The Illinois modified preliminary term reserve method has been relegated to the exercises, joining the

* Books and other publications noted with an asterisk (*) may be borrowed from the library of the Society of Actuaries under the rules stated in the *Year Book*.

New Jersey method. A major addition to the chapter is a discussion and mathematical development of the adjusted premium method for determining minimum cash values, the method now prescribed by the laws of most states.

The most extensively rewritten chapter is the one on "Population Theory," which now appears in Part 1 of the textbook as chapter viii. The new edition takes an entirely different approach to the development of the subject matter. Under the new approach the first four sections continue to deal with the mortality table as a survivorship group model. The concept of the mortality table as a stationary population model comes later. Thus Jordan initially defines L_x , T_x , and Y_x mathematically and then develops concrete interpretations in terms of the survivorship group. Similar treatment is given to the expectation of life.

Only then is the stationary population concept introduced. This approach enables the author to point out situations in which solutions to problems for the two different models involve the same mathematics, even though the interpretations are different.

Problems involving segments of the population now living, peculiar to the stationary population model, are discussed under two headings—(1) those involving all members of a subset and (2) those involving only the ones who die under certain specified conditions. Problems in the latter category are rather difficult for students, and Jordan has come to their rescue with a generalized double integration formula that can be used for a wide variety of such problems. The Grace-Nesbitt method is also included.

Chapter x of the revised edition combines the material dealing with the last-survivor and general multilife statuses into one chapter. Chapter xi, dealing with contingent functions, has been improved by the inclusion of discussion of the evaluation of such functions in the elementary case where the lives are of equal ages. This better prepares the student for the more general discussion of unequal ages that follows.

Chapter xiv ("Multiple-Decrement Tables") now includes a discussion of accidental death benefits. The formulas based on the double-decrement table that is the theoretical model for this benefit are developed first, followed by the practical approximation in common use.

A brand new chapter covers pension plans and disability benefits. Entitled "A Generalized Model," chapter xvi develops a single model applicable for both pension and disability benefits. The model is based on (a) a multiple-decrement table that measures the risk of transfer to state g ; (b) a rate of interest i ; and (c) a table of present values of annuities for lives in state g . In the development of commutation functions for this model, annuity values are thought of as weight functions to be applied to C and D . The C 's and D 's so weighted are identified by a prefixed superscript. Similarly the salary scale is a weight function in computing commutation functions for application of the general model to pension mathematics.

The model is applied to pension plans to develop present values in terms of commutation functions for retirement benefits. The simple case of a continuous annuity of 1 per annum commencing at retirement is discussed first. This is fol-

lowed by the development of formulas for retirement benefits based on final salary, final average salary, and aggregate salary. The material on pension mathematics is concluded with a section on determining present values of employee contributions and withdrawal benefits based on refund of contributions at interest.

The second application of the generalized model is to value disability benefits. Formulas are given for the calculation of premiums for disability income and waiver of premium benefits. The chapter is concluded with sections on disability reserves and on approximate methods commonly used in current disability practice.

One is hard put to find anything about the revised edition to criticize. Almost the only thing this reviewer could find fault with was the disappearance from the Appendix of the four calculus theorems, to which any student finds himself making continuing reference, particularly if calculus is several years behind him. This, of course, if it is a defect, is a trivial one.

Nonetheless, the very difficulty in finding anything of substance to criticize is just one more indication of the continued standard of excellence that Professor Jordan has maintained. The Society of Actuaries is indeed indebted to the man, who, in the words of the Society's preface to both editions, has a "fortunate combination of technical ability and expository talent."

MURRAY L. BECKER

*Joseph C. Noback, *Life Insurance Accounting: A Study of the Financial Statements of Life Insurance Companies in the United States and Canada*, pp. xxvi, 440, Richard D. Irwin, Inc., Homewood, Ill., and Irwin-Dorsey, Limited, Nobleton, Ont., 1969.

This basic text on life insurance accounting has been designed to meet the needs of company managers, insurance commissioners, accountants, lawyers, consulting actuaries, internal revenue agents, investment analysts, professors of insurance and accounting, and other serious students of the life insurance business. To this end, it describes the generally accepted principles, practices, and procedures applied by U.S. and Canadian life insurance companies in preparing the comprehensive financial statements required by the supervisory authorities. It is both a textbook and a reference book on these statements.

The opening paragraph to the Preface of this fine new volume in the Irwin Series in Risk and Insurance could not better describe the ambitious task undertaken by the author—to start from first principles of accounting, to move on to specific applications in the financial transactions of the life insurance industry, to delineate the annual accounting cycle, to transfer the accounting results to both the United States and Canadian annual statement blanks, and to conclude with a reconciliation of the differences between them.

Mr. Noback's many years of close association with his subject matter, both in company work and as an instructor of actuarial students, have provided him with the unique background necessary to bring together the blending of account-

ing and actuarial sciences demonstrated throughout this volume. He is also indebted to the advice provided by a talented review committee encompassing members of the Society of Actuaries and the Canadian Institute of Actuaries, as well as to the specific assistance of three other actuaries and one legal counsel who prepared material for five of the thirty-eight chapters.

The book has already received recognition by being placed on the Syllabus for Part 6. It replaces much of the material which has heretofore been available only as study notes.

In this type of book the reader can well afford the time to become thoroughly familiar with the purpose and structure of the text before plunging into a detailed reading. The author seems to have anticipated this by providing comprehensive summaries at the beginning of each of the nine parts. This reviewer recommends that the summaries be read consecutively, immediately after a thorough perusal of the Preface. The next order of business should be a leafing-through of the one hundred twenty pages of appendixes in order to comprehend the scope of the several completed annual statements, reports, and instructions which they cover.

Part I is an introduction made up of two relatively short chapters. In chapter i the author makes it clear that the main thrust of the book is to be devoted to life insurance financial statements. After defining accounting and the responsibilities of the accountant, he quickly proceeds to a description of the functions of life insurance companies and the ways in which they are supervised in the United States and Canada. He then gives a brief history of the several association blanks used by United States companies from 1849 to the present.

Chapter ii presents a brief exposure to the entire field of general accounting by offering a detailed example of how a sophisticated newsboy might keep his personal accounts, using two different double-entry bookkeeping systems. The first system shows how transactions might be limited only to real accounts but, in so doing, will omit any explanation of change in net worth. The second system uses nominal accounts as well as real accounts and illustrates in much detail how the newsboy might prepare his own trial balance, summary of operations, surplus account, and balance sheet. A quick transition is then made from the newsboy, whose total assets are \$22.85, to the fundamental steps for accounting in the ABC Life Insurance Company, which has assets of approximately \$10,000,000. The purpose of the exercise is to show that the essential accounting cycle of the insurance company is an exact parallel to the newsboy's system, which uses nominal accounts. This is admirably portrayed by accounting worksheets that follow the same pattern in each case.

Part 2 is composed of eight chapters describing the individual financial transactions of a life insurance company. The purpose is to illustrate the types of accounts the company must establish and what debits and credits will properly reflect the multitude of transactions that take place each day. In order to cope with the subject successfully, the author has wisely used only an abridged set of thirty-four master ledger accounts in the descriptive process and virtually ignored the great mass of subaccounts made necessary in actual practice to

allocate transactions by lines of business. The master accounts are basically those needed for the individual items in Exhibits 12 and 13 of the Association Blank, together with ledger liabilities and net worth accounts. For example, life insurance premiums are considered as all belonging to one master account, whereas in actual practice they would be subdivided in many ways.

In chapter iii each of these master ledger accounts is defined and briefly described. The balance of Part 2 (chaps. 4-10) is devoted to a much more careful analysis of each of these master ledger accounts. For some of them a rather lengthy description is required. For others only a short paragraph is given. Chapter iv, for example, is exclusively devoted to bond and stock transactions. This is capably done, particularly with respect to bonds. The terminology is thoroughly explored, and a large number of sample transactions that cover the bookkeeping procedures whenever a bond entry is required are shown. The illustrative amortization schedules are of much value in bringing out points mentioned in the text. Similarly, chapter v on mortgage loans and chapter vi on real estate cover each subject comprehensively. In particular, the mathematical formulas and sample schedules for the principal methods of depreciation of real estate are a very fine contribution to the literature.

In the succeeding chapters policy loan and other asset transactions are explained in detail. The transactions involving ledger liabilities are explored, and the increase and decrease accounts of Exhibit 12 are described sufficiently well that an accountant may easily become familiar with the principles necessary to keep a satisfactory set of books for his company.

The scene now changes to the special requirements of Exhibit 13, relating to the differences between "ledger assets" and "admitted assets." Part 3 of the text includes five chapters devoted to this subject. Chapter xi should be the most important to a general reader. In it the author attempts to explain why and how an accountant moves from those assets shown on a company's books to those assets which may be admitted in the annual statement. This reviewer believes that the resulting treatment is weak, particularly on the topic of uncollected and deferred premiums. There is no good explanation of why a company is justified in admitting these as assets. The definitions of terms are not always clear, and the illustrations are inadequate. For example, the word "loading" is introduced at this point with no definition at all, and the only definition of "deferred premiums" is as follows:

The gross premiums, which are deferred premiums at the end of any calendar year, are the premiums—for policies classified as premium-paying on the company's valuation records—that fall due both within the current policy year and within the next following calendar year.

In this chapter, the author makes frequent mention of items in Exhibit 13 of the Annual Statement and apparently assumes that the reader will refer back and forth to the illustration of Exhibit 13 given in Appendix A. Unfortunately, there seems to be no suggestion on the part of the author to do this. The same criticism applies in several places throughout the text. It is also note-

worthy that no mention is made that unpaid premiums on reinsurance ceded are to be deducted from the net asset value of uncollected and deferred premiums in Exhibit 13.

Chapter xii and xiii drift away from the main theme of the book while tracing a short history of the regulations prescribed for valuation of life company assets from 1874 down to the present time. This represents excellent research and should be of much assistance to a few individuals who from time to time must help revise the regulations. Most readers will probably pass over these chapters with the thought that the subject matter will be of no immediate benefit to their work. However, such readers must not yield to the temptation to pass by chapter xiv also. This rigorous discussion of the rules employed in the calculation of the Mandatory Securities Valuation Reserve deals with a topic which must be mastered by someone in every life company. But what a formal and cold discussion it is! The author has missed a perfect opportunity to provide a complete illustration of the calculation of the MSVR for his model company. He has failed to warn the reader that the NAIC *Book of Valuations of Securities* employs a set of symbols that needs careful study before one attempts to classify bonds and stocks into their proper MSVR components. Finally, he has made no reference to the fact that the MSVR rules differ before and after a life company's fifth corporate birthday.

Part 4 of the text is a recitation and description of the liabilities, capital, and surplus items found on page 3 of the Annual Statement. The material is covered in sufficient depth to satisfy most needs. This reviewer wonders, however, if it is made sufficiently clear from what sources the typical company accountant can expect to receive data related to the nonledger liability items for his company. Here, as in Part 5 (which is a highly technical discussion of policy reserve liabilities), one has the feeling that the chapters are being written only for actuaries. Actuaries will find in Part 5 an excellent summary of life contingency formulas and statutory reserve requirements for various lines of insurance, including accident and health. (The inclusion of this material certainly sets this book apart from any previous text on life insurance accounting.) Whether or not it will be of assistance to individuals who are not actuaries is a question which is most difficult to answer.

Part 6 picks up again with the completion of the Annual Statement. Mr. Noback demonstrates symbolically how the Annual Statement Blank is constructed and why it must balance itself from year to year. His chapter xxvi, on the theory of life insurance accounting, is a monumental contribution to the serious student. He then puts this theory into practice by detailing the annual accounting cycle for his model life insurance company and by explaining the development of the balance sheet and summary of operations according to the worksheet method of constructing adjusting entries to the trial balance. This is hard reading, and it is not easy to dip in later for a quick refresher in connection with any specific item.

In the author's words, "The subject of life insurance accounting reaches a climax in Part VI. Here is a panoramic view of the entire annual accounting cycle." This reviewer shares this opinion but only to a limited extent. We differ

over the relative value given to the exhibits. The reader of the text may be left with the impression that the balance sheet, summary of operations, and surplus account are all neatly wrapped up first and that the various supporting exhibits are then filled in as an afterthought. Nowhere is it mentioned that most practitioners use the Annual Statement Blank for its intended purpose as a workbook and that they complete the various supporting exhibits as a means of obtaining the entries for pages 2-4 of the Annual Statement. As a result, the text treats the exhibits, the analysis of operations, and the large number of important schedules only in a descriptive and quite superficial manner. Details concerning the actual mechanics of Annual Statement preparation and the numerous highly significant relationships between the various exhibits and schedules are practically nonexistent.

Part 8 reviews the Canadian life blank in much briefer fashion than was accorded the United States Association Blank. It is entirely exposition and makes no attempt to develop the subject to the same extent, since many of the same basic accounting principles apply to both countries. However, persons working with both annual statements will find much help in chapter xxxv. It is devoted to a full description of the adjustments necessary to reconcile the Association Blank and the Canadian Blank. Canadians concerned with accounting for the currency of several different countries can read chapter xxxvii to their profit.

This book should and will become a part of the library of nearly every life insurance company in the United States and Canada. It is strong in the area of accounting transactions but weak in its grasp of the multitude of problems facing each company comptroller at the year end. It sets forth the theory underlying life insurance accounting better than any other text has ever done, but it fails to make it evident that the preparation of the annual statement for a particular company can be a vibrant and creative experience.

The life insurance industry is deeply indebted to Mr. Noback for making the results of his diligent scholarship available to all.

CHARLES M. BEARDSLEY

Mortimer Spiegelman, *Introduction to Demography* (rev. ed.), pp. 514, Harvard University Press, Cambridge, Mass., 1968.

This revised edition of *Introduction to Demography* represents a very thorough revision and rewriting. The text proper has been enlarged from 257 to 422 pages, the bibliography from 35 to 78 pages. (While both page size and type size differ, the number of words per page is slightly greater in the new edition.) Two new chapters, on income and on socioeconomic status, have been added. For the remaining twelve chapters, the revision is not limited to updating and addition of new material; they have been completely rewritten. The general outline and sequence of contents have been maintained, but in its details this is an entirely new book.

This volume fulfills superbly the promise of its title. It provides an excellent and lucid introduction to all important aspects of demography. Within each broad area definitions and general principles, kinds of data available, data-

collection mechanisms, and analysis and interpretation of data are all fully and carefully treated. As a result, this is an excellent text for an introductory university course in demography, and it will certainly find wide usage in this role. This aspect of the book is related, no doubt, to its publication by Harvard University Press rather than by the Society of Actuaries. It will also be extremely valuable as a reference work, as the author has taken great pains to mention all important developments and to cite all important publications. As was the case in the previous edition, each chapter was critically reviewed by one or more specialists in the area concerned. This should make the book one of the most authoritative in its field. The arrangement of chapters and sections is such that desired information is easily located.

The author concentrates heavily, but not exclusively, on conditions and practices in the United States and Canada. He appears to have been very conscientious in seeking to give Canada adequate coverage.

In a book of such uniformly high quality it is difficult to single out portions for special mention. However, I have found the description of the National Health Survey and the data emanating from it and the new chapter on income and socioeconomic status particularly interesting and informative.

As was true of the previous edition, the very extensive and complete Bibliography is keyed to chapters and sections but not to specific locations in the text. Actual footnotes are kept to a minimum and are placed at the bottom of the pages to which they refer. The frequency of typographical and other minor errors seems to be surprisingly small.

To this reviewer the present volume seems to differ from the earlier one in having little, if any, specific orientation toward the actuarial profession. Indeed, the nonactuarial reader unacquainted with the previous edition may well wonder why the book contains a foreword signed by officers of the Society of Actuaries. In a university text on demography this lack of special orientation is, of course, highly desirable. I would recommend, however, that the Education and Examination Committee undertake some reassessment of the precise role of this book in our examination system. As was the case with the previous edition, the required reading consists of the first seven chapters, and the number of pages in these chapters has been increased by about two-thirds. The additional material is almost entirely of such a nature that its detailed study would involve memorization rather than mastery of principles, and some of it (e.g., the detailed mechanics of data collection), though important to the demographer, would seem to be of limited interest to the actuary or actuarial student. There is already a suggestion in the Syllabus that chapter v is considered more important than the remaining six required chapters. The Part 5 student would certainly welcome some guidelines as to which material will be emphasized in these other chapters.

These last remarks certainly are not to be construed as in any way critical of Mr. Spiegelman. We are greatly in his debt for this excellent text on demography and for his many services to the actuarial profession.

T. N. E. GREVILLE

*Joseph A. Pechman, Henry J. Aaron, and Michael K. Taussig, *Social Security: Perspectives for Reform*, pp. vii, 352, The Brookings Institution, Washington, D.C. 1968.

Review by R. M. Peterson

This book is the fourth title under the rubric of "Brookings Studies in Social Economics." (Other titles are *The Doctor Shortage: An Economic Diagnosis*, by Rashi Fein; *Medicare and the Hospitals: Issues and Prospects*, by Herman Miles Somers and Anne Ramsay Somers; and *Education and Poverty*, by Thomas I. Ribish.) In the Foreword, Kermit Gordon, President of the Brookings Institution, states:

This study is designed to clarify the issues involved in social security and to examine the need for change. As the first comprehensive analysis of the present program in many years, it considers the deficiencies of the present program and alternatives for improvement.

The three authors are economists. Pechman is Director of Economic Studies at Brookings, Aaron is on the faculty of the University of Maryland, and Taussig teaches at Rutgers. Aaron and Taussig have been or are staff members of Brookings.

There has long been a need for a comprehensive review of the OASDHI system by well-informed economists. Readers may differ on how fully and satisfactorily this book meets that need. The Introduction states, "As much as possible, the economics of the subject will be stressed rather than the institutional details of the vast social security apparatus." The book does stimulate added insights and advocates changes that, at least, are quite provocative. As a well-organized and well-written work, it is easy to read for the most part.

In this review, the substance of the book's content is given and that is followed by a critical appraisal.

CONTENTS

The main text, 227 pages, is comprised of nine chapters with the following headings: i, "Introduction"; ii, "The Economic Status of the Aged"; iii, "Development of the OASDI Program"; iv, "The Objectives of Social Security"; v, "The Benefit Structure"; vi, "Social Security and Retirement"; vii, "Costs and Benefits of Social Security"; viii, "Financing Social Security"; and ix, "Agenda for Reform." Each chapter (except ix) has a concise summary. Appendixes A-H (pp. 229-340) contain material that supports the text, statistical tables, and a selected bibliography. A useful index is provided.

The Introduction states the basic approach in these words:

Although there are many differences between social security and private insurance, the idea of social security as a form of insurance has widespread acceptance and appeal. The differences are significant, however, and this volume argues that the present program is more appropriately viewed as a system of transfers which, like any other government program, must be financed by taxes. This approach provides the conceptual basis for the analysis and for devising methods to improve the major features of the program.

The summary of chapter ii concludes:

About 30 percent of all persons aged 65 and over are below the officially defined poverty threshold. The proportion is probably overstated because of the failure to consider the assets of the poor, and it will decline as the social security system matures. Nevertheless, the incidence of poverty among the aged will remain high for a long time to come.

Chapter iii is a brief account of the development of the OASDI system, with a comparison with systems of other countries. The detailed material in Appendix B, "History of Social Security Legislation," in Appendix C, "Foreign Social Security Systems," and in Appendix D, "International Comparisons," constitutes an interesting and useful adjunct.

Chapter iv (an early draft of which appeared among the *Joint Economic Committee Compendium of Papers on Old Age Income Assurance* in 1967) sets forth the authors' concept of the objectives of social security. They identify two that are "conceptually distinctive": (1) "to guarantee minimum income support for the aged, the disabled, and dependent survivors" (i.e., rescue from poverty) and (2) "to help moderate the decline in living standards when earnings of the family head cease because of retirement, disability, or death." The first objective reflects widely accepted humanitarian values. The second is needed to overcome the "shortcomings of individual savings decisions" and the "shortcomings of private pension plans." These "shortcomings" serve as the "rationale both for a government social security program and for government subsidies to private *group* saving, principally to the numerous private pension plans." (As a result of a criticism by this reviewer of the *JEC Compendium* draft directed to Dr. Pechman in February, 1968, the following paragraph was changed in the book as follows (bracketed words deleted):

The shortcomings of private pension plans persist despite [substantial] incentives given by the income tax and other federal statutes for the development of adequate plans by industry. A major incentive is the provision that allows an employer to deduct from his taxable income [*up to 5 percent of his payroll for*] *the* amounts set aside in a pension plan approved by the Internal Revenue Service.)

The authors severely criticize the "insurance" image of social security as promoted by some social insurance experts, including members of the Social Security Administration.

The following final paragraph of chapter iv which did not appear in the *JEC Compendium* draft, suggests another objective of the social security system as seen by the authors.

Finally, the foregoing discussion strongly suggests that there is little basis for according autonomy to the social security system in the federal budget. This has been recognized by the changes incorporated in the budget for fiscal year 1969—following recommendations by the President's Commission on Budget Concepts—which combined trust funds and other federal expenditures and revenues in a single budget. Social security today is too intimately linked on both the benefit and tax sides with the total govern-

ment budget for fiscal autonomy to make sense. The integration of OASDI into government budget planning is a necessary step in rationalizing the processes for attaining the objectives of social security.

The ideas and proposals for change developed in chapters v-viii may be summarized by giving the substance of chapter ix, "Agenda for Reform." Proposals for change are presented in three dimensions: (a) long-term total reform, (b) medium-term goals to "remove the most serious shortcomings" of the present system, and (c) immediate legislation action.

TOTAL REFORM

The long-term program contemplates two separate systems: (a) a strictly wage-related social security system with the replacement rate roughly the same at all earnings levels between subsistence and the median earnings rate and (b) the income support function served by a negative income tax or a comprehensively reformed public assistance system. With a good negative income tax, dependents' allowances are considered unnecessary under social security. Such a dual system, it is held, has the advantages of efficiency and flexibility; either could be altered independently.

At present, any effort to improve social security with respect to the income support function typically requires substantial improvements with respect to the earnings replacement function. For example, a program to raise minimum benefits to help the aged poor must in practice be joined with a general benefit increase, thereby making the cost of aiding the poor seem greater than it is . . . higher minimum benefits would be paid to individuals with adequate incomes.

PARTIAL REFORM

Since the prospects for total reform are considered dim because of the political appeal of the present form of social security and the controversial nature of the negative income tax, medium-term (during the next one or two decades) goals are proposed.

1. *Benefit formula.*—

a) Principle: "Families with equal standards of living before retirement would receive benefits that enable them to have roughly equal standards after retirement, although lower than pre-retirement standards."

b) Earnings base: Average combined earnings of husband and wife up to maximum equal to about median family income level; average earnings either adjusted to reflect relative earnings level in each year in which income is earned or highest five years.

c) Formula: For single person or widow, \$90 monthly plus 30 per cent of average monthly earnings; for each dependent, \$30 monthly with no family maximum. (Earnings taken as not less than \$100.)

d) Changes after benefit award: Benefits, once awarded, adjusted automatically for changes in the consumer price index. Any other changes reflecting share in productivity gains subject to legislative discretion.

e) Comparison with present formula: Substantial increases for one- and two-

person households with largest increases for widows and past recipients of low earnings. Large increases also for family units of four or more. Benefits of three-person households with high earnings histories would not be increased.

2. *Coverage extension.*—Social security system should be extended to all government employees to avoid the inequities that arise through dual or multiple entitlements.

3. *Early retirement.*—Benefits to early retirees should be discontinued in view of improvements in health and gradually increasing longevity. Needed early retirements should be covered through disability program or unemployment compensation, or both. Those now receiving reduced early retirement benefits should be increased to nonreduced rate.

4. *Retirement or work test.*—This test should not be liberalized, since greater outlays occasioned thereby accrue to persons whose economic status on the average is superior to that of those who do not work. To secure social benefits of work after age 65, "delayed retirement credits" might be given to late retirees (but not based on actuarial considerations).

5. *Actuarial calculations.*—"Long-range actuarial calculations should be de-emphasized in determining social security policy. To reflect the future burdens of social security benefits on the economy, the long-range estimates should be based on the assumption that earnings will continue to increase, and they should be evaluated in terms of the relationship of projected costs to the national income rather than in terms of the actuarial balance concept now used. Short-range estimates, based on the same forecasts of economic trends that are used by the President in his annual Economic Report and Budget Message, should be emphasized in planning changes in the benefit and tax structure and in coordinating such changes with the government's overall fiscal policy."

6. *Financing.*—In order to "remove the inequities, both vertical and horizontal, in the payroll tax," (a) the employee payroll tax should be regarded as part of the withholding tax under the individual income tax, with overpayments to be refundable after the final income tax return, (b) the employer's tax should be replaced by general revenue, and (c) there should be no difference in taxes paid by wage and salary workers and by self-employed. "The payroll tax might be retained as a withholding tax to focus attention on social security and on the fact the support of the current aged by the working population establishes the claim of the latter group for future support," although this could be achieved by earmarking a portion of the individual income tax. Alternatively, the "regressivity of the payroll tax" could be tempered by an exemption and minimum standard deduction in the payroll tax itself.

PROPOSALS FOR IMMEDIATE LEGISLATIVE ACTION

Since the partial reform proposals are expensive ("would increase the costs . . . by roughly 50 percent in 1968"), more modest changes should be enacted in the next round of social security legislation.

1. Provide refunds of social security taxes paid by individuals whose earnings do not exceed their personal exemptions plus the minimum standard deduction.

The cost of \$0.7 billion could be recovered by terminating the special benefits now accrued to aged households under federal income tax legislation (including tax-free social security benefits). When a cut in federal taxes becomes appropriate, allow some fraction of social security taxes to be treated as withheld income tax and pay a corresponding amount to trust funds from general revenues.

2. The earnings of the family should be adopted as the unit for computation of benefits.

3. Raise widow's benefit to 100 per cent of worker's benefit.

4. Increase minimum to \$75 monthly for single person and to \$105 monthly for couples. Further increase in minimum benefit should follow later unless separate income floor has been developed.

5. Base newly awarded benefits on average earnings of ten years of highest earnings. Recompute benefits in current payment status on this basis.

6. Benefits in current payment status should be adjusted automatically for price changes.

7. Additional survivor benefits of \$30 monthly per dependent for households with more than two surviving children, eliminating family maximum.

8. Establish permanent ceiling on benefits payable to wives and other dependents "to help move social security towards the standard-of-living approach to the computation of benefits." This could be done by raising benefits for single persons more rapidly than for couples.

9. Discontinue early retirement benefits in the future, but unreduced benefits should be provided for those genuinely incapable of work.

10. "To encourage the continued employment of healthy, aged persons who wish to continue working, experiments with modest delayed retirement credits should be conducted, perhaps restricted at first to persons aged 65-67."

Viewing these "Perspectives for Reform" in perspective, one may ask whether there is a subjective influence arising from the particular interest and disciplines with which the authors have been associated. Dr. Pechman is an acknowledged expert in the field of taxation and is credited along with Dr. Walter W. Heller—devotees of the "new economics"—with developing some of the fiscal management ideas of the Kennedy and Johnson administrations. As such, he may be expected to be concerned with "horizontal and vertical equity in taxation," to be possessed by the "regression obsession" over the OASDI payroll tax, and to be interested in manipulation of OASDI taxes and benefits as possible instruments of fiscal policy. Private pensions are mentioned only briefly (even brusquely) in an uninformed manner on pp. 64 and 112-13. Is this significant? What do the following words reflect as to the authors' knowledge and belief about the role of private life insurance? "Although evidence is not available, it is safe to assume that . . . non-aged dependent survivors share with the aged the problem of inadequate income" (p. 6).

Does the Selected Bibliography give us perspective on the range of reading interest of the authors? There is a great preponderance of recent items. Of the 83 books and monographs, 47 are dated 1965 or later and 12 in the period 1960-

64. Of the 73 articles, 51 are dated 1965 or later and 11 appeared in 1960-64. An overwhelming proportion of these articles were written either by economists (nongovernmental) or by government employees, mainly in the Social Security Administration, with generous contributions from Robert J. Myers. The distribution follows:

Economists	38
Government employees	26
Independent actuary*	4
Miscellaneous	5
Total	73

* Incidentally, this reviewer.

Notably absent from the articles is the 1938 classic paper of Reinhard A. Hohaus, "Equity, Adequacy, and Related Factors in Old Age Security." A Brookings publication of 1950 is missing—*The Cost and Financing of Social Security*, by Meriam, Schlotterbeck, and Maroney. Nor do we find among the books an informative collection of selected readings edited by Haber and Cohen, entitled *Social Security: Programs, Problems, and Policies* (1960). Finally, an excellent textbook, *Economic and Social Security* (3d ed., 1967), by Turnbull, Williams, and Cheit might well have been included.

CRITICAL APPRAISAL

This reviewer agrees with the following selected statements from the books. On the importance of economic growth:

The financial soundness of the social security program depends only on the government's effective power of taxation. The government's ability to collect taxes sufficient to provide adequate social security benefits in the future depends critically on the maintenance of a sound federal tax system in a healthy, growing economy. The faster the rate of economic growth, other things equal, the lighter the burden of taxation that will be required to finance any given absolute level of future social security benefits [pp. 72-3].

On recognition of the intergenerational *quid pro quo* which is the *real essence* of the social contract constituting "social insurance":

In place of the insurance analogy, social security should be regarded as an institutionalized compact between the working and nonworking generations, a compact that is continually renewed and strengthened by every amendment to the original Social Security Act [p. 75].

On the maximum tax and benefit base (with some reservations as to the use of "total family earnings"):

In view of the competing uses for public funds, including other changes in the social security system, increases in the taxable maximum earnings should be modest in the immediate future. We propose as a rule of thumb that social security benefits be computed on the basis of total family earnings up to about the level of median family income [p. 96].

On including social security benefits in taxable income: "In principle, it would be fairer to remove the additional exemption for age and make all retirement income taxable." While this reviewer (now over age 65) has long favored, and still does, the inclusion of social security benefits in taxable income, he also has believed that social security tax contributions of workers should be tax-deductible, as is the case in the vast majority of foreign social insurance systems—a fact which these tax-oriented economists, surprisingly, fail to mention in their description of foreign systems.

The conceptual basis of the book, as stated, is that the OASDI program is a system of transfer payments and, thus, not "insurance." But all forms of private insurance—life, fire, casualty—are systems of transfer payments in the economic sense, since they do not, in themselves, add to the national product. Thus the distinction the authors seek to make seems hardly valid. (Strangely enough, the "transfer" characteristic of private insurance is recognized on p. 71.)

OBJECTIVES

Although the "poverty rescue" objective of social security may have been, in the opinion of the authors, a function of social security, there is no evidence that, in the past, the minimum benefit was designed to keep people out of poverty. It has ranged from \$10 monthly in 1939 to \$55 monthly currently. As such, it has amounted to only 40–50 per cent of the average amount of benefit awards from year to year. As Lenore Epstein of the Social Security Administration wrote in the March, 1967, *Social Security Bulletin*:

The primary function of social insurance is to provide a substitute income when employment is interrupted or ceases. . . . The minimum benefit itself is not, however, intended to provide an adequate income. A full-time worker who earned as little as the legal minimum wage would be entitled to a primary insurance amount (PIA) considerably above the fixed dollar minimum.

Consistent with the "total reform" objective of the authors, social security should be predominantly, if not exclusively, an earnings-related system that grows out of a worker's contribution to the national product as a person with substantial labor-force connection. Only very minimal benefits are appropriate for persons with very limited connection with the labor force, that is, the system should not serve as a means of solving the poverty problem except as its benefits, derived from productive effort, *prevent* poverty.

The authors display a surprising lack of knowledge of the operations of private pensions and also cling to the myths of government subsidies and tax incentives. As this reviewer has previously contended,¹ there is no proof of a long-term government subsidy; also, the so-called tax incentive should be considered as the absence of a tax disincentive.²

The new consolidated budget under President Johnson's last budget and now under the Nixon Administration is giving the public the wrong impression of the

¹ *Joint Economic Committee Compendium*, pp. 209–39.

² *C. L. U. Journal* (April, 1969), pp. 41–60.

source of the expected surplus for fiscal year 1970, since most of it, if not all, arises from a normal and planned growth of the Social Security Trust Funds. Indeed, such consolidation can conceal (and may be doing that currently) a significant deficit in the "administrative" budget. In order to assure public support and confidence in the social security system and to promote understanding, it is essential that the *separate identity* of the system be clearly defined and maintained. The manipulation of social security taxes and benefits as a part of fiscal policy under the consolidated budget would seriously impair that separate identity.

BENEFIT FORMULA

As benefit-formula rationale, the authors recommend (1) the principle of maintaining the *relative* preretirement (or prebenefit-commencing) standard of living for all sizes of family units for all earnings levels from subsistence to the maximum wage base; (2) the use, as the benefit base, of combined husband and wife earnings; and (3) recognition of the need for an earnings or benefit income increment of only 30 per cent for each additional member of the family unit. Thus, for a given level of average monthly earnings (AME), the social security earnings base would be AME for a single person and $AME/[1 + 0.30(n-1)]$ for a family unit of n persons, that is, the lower standard of living for the second case is maintained. In the light of this "standard of living objective," they find the present increments for a wife and for the first two of surviving children too generous, but they would eliminate the family maximum and provide a 100 per cent benefit for a widow.

The family benefit would be as follows where B is the benefit and R is the income replacement rate. Where R is the same for all earnings levels, as under their "total reform" program, the family benefit is the same for all sizes of families. For a family of one $B = R \times AME$, and for a family of n persons, $B = R \times AME/[1 + 0.30(n-1)] \times [1 + 0.30(n-1)]$ or $R \times AME$. Where R is determined by a formula weighted in favor of lower incomes, as under the authors' "partial reform" program or the present OASDI formula, the increment for each added family member is a constant where such formulas may be expressed, essentially, as a constant (K) plus a uniform percentage (P) of earnings. For a family of one, $B = K + P \times AME$. For a family of n persons, $B = \{K + P \times AME/[1 + 0.30(n-1)]\} \times [1 + 0.30(n-1)] = K[1 + 0.30(n-1)] + P \times AME$. The difference between that for a family of more than one, n , and that for a family of one is $K \times [0.30(n-1)]$.

Under the present OASDI primary amount formula, which may be expressed, approximately, as $\$49.50 + 0.26 \times AME$, the constant increment for each added family member would be only about \$15. In order, apparently, to produce a more respectable-looking increment, the authors recommend a more heavily weighted PIA formula, that is, $\$90 + 0.30 \times AME$ (with AME credited as not less than \$100); for a family of n members $\$90 + (n-1) \times \$30 + 0.30 \times AME$, that is, an increment of \$30 for each added member. For a single worker, the recommended replacement rate ranges from 120 per cent for a

\$100 AME, 60 per cent for a \$300 AME, to 43.8 per cent for a \$650 AME. This compares with the present corresponding replacement rate of 71.5 per cent for a \$100 AME, 42.4 per cent for a \$300 AME, and 33.5 per cent for a \$650 AME. The relation of a couple's benefit (or that of a surviving widow and one child) to that of a single worker, under the recommended formula, ranges from 125 per cent for a \$100 AME to 110.5 per cent for a \$650 AME, compared with the present uniform ratio of 150 per cent for a couple or 157.5 per cent (benefits claimed at age 62 or over) for the widow and one child. This reduction of ratio is produced, mainly, by an approximately flat increase of over \$40 monthly for the single worker and by raising the widow's benefit to the dollar amount of the single worker with little increase in other multiple beneficiary benefits except for the widow with a low AME and many children.

Although, under the present OASDI system, the increments for wife and for widows and surviving children follow the pattern of many social insurance systems, we should welcome the impetus for re-examination afforded by the authors. (A dollar ceiling on the wife's benefit now exists but is virtually meaningless, since it generally has no applicability for many years to come.) Since the replacement rate for a low-income widow with a family of good size can greatly exceed the AME, the elimination of the family maximum seems hardly consistent with their standard-of-living principle.

The recommended substantial increase in minimum benefits for "immediate action" and the heavily weighted benefit formula under their "partial reform" program constitute serious obstacles to reaching the eventual pattern, under "total reform," of a uniform replacement rate for all sizes of families in the neighborhood of 40-50 per cent. Indeed, it is difficult to see "how to git thar from hyar"—from partial reform to total reform. How do you get from high replacement rates to a lower level? How could substantial benefits for dependents (including survivor benefits as a matter of right having an insurance equivalent of hundreds of billions of dollars) ever be replaced by a negative income tax (or similar program) with an income test and with the legal character of any benefit right still to be defined? The difficulties of any such transition are so great that one wonders how sincerely the authors believe in the practicality of their "total reform."

EARLY RETIREMENT

The authors have a worthy objective in seeking a practical and fair method of encouraging later retirement.

ACTUARIAL CALCULATIONS AND FINANCING

An accompanying partial review by Robert J. Myers covers chapters vii and viii. This is quite appropriate in view of the authors' critical comments regarding the cost estimate methodology and the special qualifications of Mr. Myers.

This reviewer will make only two points with respect to actuarial calculations. First, in response to the authors' claim that "conservative" actuarial as-

assumptions have unduly held down acceptable benefit increases, here is a statement made by Mr. Myers in 1953 (*Social Security Bulletin*, 1953, p. 7):

In any event, whether a large fund or only a contingency fund is favored, the financing basis to be adopted is secondary, primary consideration must be given to the benefit and coverage structure. Certainly, the financing method should not serve as a "straight-jacket" on the benefit and coverage provisions.

Second, in these days when the Congress has been trying, almost fruitlessly, to find some means of controlling over-all expenditures in the near and distant future, the performance of the Ways and Means Committee and the Senate Finance Committee, guided by the skillful professional work of the Chief Actuary of the Social Security Administration, in responsible and effective control of social security commitments stands out like a shining beacon in a darkened world.

As to financing methods, the authors' proposals of merging the payroll tax with the individual income tax, including recognition of exemptions for dependents, will not only impair the separate identity of the social security system but would provide special income tax benefits for those who benefit most from the survivor protection. General revenue financing can open the door to great growth of what would become future "uncontrollable" expenditures of the same character as interest on the debt.

While it would be of interest to observe relations of projected social security outlays to projected national income, how could such comparison serve any better than the use of projected taxable payrolls, which constitute, perhaps, about 70 per cent of national income? More importantly, as economists the authors might well offer their recommendation as to what is a desirable relation to national income with due consideration of the forces promoting economic growth.

AVERAGE MONTHLY WAGES

The method of computing average monthly wages deserves periodic reconsideration. Perhaps the simplest means of change is to increase the number of low-earnings, "drop-out" years. The automatic increase in benefits with increase in the consumer's price index removes a desirable discretionary power of the Congress and creates a precedent that, by protecting one large segment of the population from inflation, could stimulate great demands for protection of other financial interest of many kinds.

As Mr. Myers indicates, the authors, in their actuarial excursions, have not been particularly brilliant. In this connection, this reviewer wishes to point out a great flaw in Appendix A, "Individual Equity Calculations for the OASI Retirement Programs." This appendix presents ratios of the "discounted value of the expected benefit stream" for old age benefits to the "accumulated value of total taxes at compound interest at retirement." Taxes for old age benefits are assumed to be 80 per cent of employee and employer OASI taxes. This ratio, designated as V , is computed on several different static and dynamic assumptions. Since the authors failed to accumulate contributions with benefit of

survivorship, *all* of the values of V are materially *understated*. For young new entrants to the labor force, this deficiency in actuarial methodology can be corrected only by increasing the V for single males by 35–40 per cent; for single females, by 15–20 per cent; and, for couples, by 25–30 per cent.

As a final comment, the following observation is made. As economists, the authors, while recognizing the vital importance of economic growth, have failed to provide an answer to a question that they should be peculiarly qualified to answer. Looking to the long future and in the light of the tremendous demands of the future on tax revenues for other purposes, how much of current income can be compulsorily redistributed to nonproducers without seriously impairing the savings capacity and willingness of producers, with the consequent depletion of future sources of capital? The authors would increase social security benefits substantially because of the “shortcomings” of private savings in providing old-age benefits. Would the result be to make the “shortcomings” even shorter with further undesirable impact on savings? Perhaps Brookings should sponsor another book.

R. M. PETERSON

Review by Robert J. Myers

This review is concerned only with chapters vii and viii, entitled “Costs and Benefits of Social Security” and “Financing Social Security.” It should be mentioned that, although the reviewer reviewed an early draft of the manuscript for factual accuracy, he did not undertake to do so for these two chapters. A critical review of this material is difficult to make in a short space, because virtually every paragraph calls for comment.

Chapter vii is primarily concerned with adverse criticism of the actuarial cost estimates for the OASDI system. This reviewer believes that most of these criticisms are based on a lack of understanding of the complicated subject matter involved. The tone of the chapter seems to be set by the following statement (p. 161): “On the basis of the considerations raised here, we believe that the long-range cost estimates do not provide the information that would best enable Congress and the public appropriately to choose among the alternatives.” In other words, the authors imply that the actuaries of the Social Security Administration are seriously to blame for the program’s being much less liberal than should really be the case under the existing financing provisions. This reviewer can hardly agree with this criticism, as will be indicated hereafter.

Some indications of the lack of understanding of the cost estimates and the underlying financing provisions of the social security program on the part of the authors are the following factual errors:

1. On page 153 it is stated that the negative actuarial balance permissible for the system to be considered soundly financed has been established as 0.3 per cent of taxable payroll. Actually, this limit was used only before 1965, at which time the limit was changed to 0.1 per cent (following the change from making the cost estimates into perpetuity to making them only for a seventy-five-year period).

2. On page 159 it is stated that the use of a $\frac{1}{2}$ per cent higher interest rate in the cost estimates would make it possible to increase benefits by about 3 per cent across the board or to increase widow's benefits from $82\frac{1}{2}$ per cent of the PIA to 100 per cent of the PIA. The fact is that such an increase in the interest assumption would produce additional income equivalent to only 0.09 per cent of taxable payroll on a level-cost basis (see p. 44 of the 1968 OASDI Trustees Report). Such additional income would finance only a 1 per cent across-the-board benefit increase or, alternatively, would provide for only 20 per cent of the cost of increasing widow's benefits to 100 per cent of the PIA.

3. On page 213 it is stated that a "reserve fund" (meaning a contingency-reserve fund) is entirely different from a "trust fund." This is not the case, because the trust-fund concept would be equally applicable to a contingency-reserve basis, a full-reserve basis, or any intermediate basis.

There are further indications of the lack of understanding of the subject matter involved on the part of the authors. They use the term "surplus" when actually referring to the excess of income over outgo in a year. Also, they criticize the use of an interest rate of $3\frac{1}{4}$ per cent on the grounds that this is below the current borrowing rate of the federal government, without considering the actual investment experience of the trust funds. At the beginning of 1967, the average yield of the total investments was 3.66 per cent (see p. 52 of the 1967 OASDI Trustees Report). The authors apparently do not recognize that interest rates over the long range might go down from their present high levels or that the interest-rate assumptions used in the cost estimates have been steadily adjusted upward as the actual experience has unfolded. Thus, for example, in the cost estimates prepared in late 1968, an interest rate of $4\frac{1}{2}$ per cent was assumed for the intermediate-cost estimates, as contrasted with an actual average yield of the total investments as of the end of 1968 of 3.98 per cent for the OASI Trust Fund and 4.64 per cent for the much smaller DI Trust Fund (see p. 51 of the 1969 OASDI Trustees Report).

The primary criticism of the actuarial cost estimates made by the authors is the use of a level-earnings assumption rather than a rising-earnings assumption. Once again, the authors fail to understand fully the basic nature and purpose of the cost estimates. In brief, if rising earnings are to be assumed, then it would also be necessary for the sake of consistency to assume that the benefit and earnings-base provisions are on a dynamic basis. If this were done—and there is some question whether it seems appropriate to assume that the law will be more or less continuously changed by Congress in any specific manner—the various level-cost analyses would show virtually the same results as they now do under the level-earnings-assumption procedure.

Actually, the effect of using a rising-earnings assumption in conjunction with the assumption that the statutory provisions will remain unchanged is to assume that the program will be deliberalized relatively in the future. Let us assume that the reduction in cost resulting from using a rising-earnings assumption is utilized to liberalize benefits currently. The near-future ratio of the average benefit to the wage on which it is based will be *higher* under the rising-earnings assumption than such ratio will be in the more distant future. This situation arises because the average wage on which benefits are based will be significantly

higher in the distant future under the rising-earnings assumption than it would be in the near future (due to the weighted nature of the benefit formula). This would then create the result that, some years hence, beneficiaries would demand higher benefits, so that their *relative* level of benefits would be as high as would be the case in the near future.

The net result would then be a much higher program cost over the long run—and corresponding higher contribution rates—than would be anticipated if the planning is on the basis of a level-earnings assumption. To put it into other words, the benefit structure in the law is based on the current-earnings level, and therefore the assumption should be made that this current-earnings level continues into the future. At such time as the earnings level does change, then the cost estimates should reflect this and the benefit structure can be modified accordingly and appropriately. In this way, current benefits closely reflect current experience as to wages. However, if increasing earnings were assumed without assuming changes in future benefits, benefits would be liberalized now on the basis of future increases in productivity and future inflation.

In summary of the authors' criticism of not using an increasing-earnings assumption, it has been shown that such a basis—which is realistic when considering only this one economic factor but unrealistic and misleading when the entire problem is considered—would inevitably result, over the long range, in a benefit level appreciably higher than could be financed by the contribution schedule that is developed to finance the existing program on the basis of using a rising-earnings assumption. Whether this criticism on the part of the authors is unwitting or whether it is made with the motive of thereby liberalizing the program by raising it to a higher cost level than is now intended is not clear.

The authors deal at some length with the topic of individual equity or whether the young worker gets his money's worth. The calculations made are of a very rough nature, even though they were performed by EDP with seemingly much accuracy and precision. For example, the calculations were made on a monthly basis (rather than using the customary actuarial procedure of annualizing monthly payments, with appropriate interest and mortality adjustments); yet, all benefit payments at ages 100 and over were ignored (apparently because of programming problems). At the same time that all this detailed work was being done, such major factors as survivor benefits for death before age 65, deferment of retirement beyond age 65, and the offset of wife's and widow's benefits by the primary benefits arising from a woman's own employment were ignored.

This reviewer takes a dim view of the various individual-equity computations that are made by nonactuaries, since they so universally ignore various important factors—and fail to understand the concept anyhow. Even for actuaries such comparisons are difficult, or perhaps even impossible, to make in a precise manner because of the many variables and intangibles involved.

This reviewer has come to the conclusion that the most that can and should be said on this subject is that the young worker—even the highly paid young worker—receives benefit protection on the average that is at least equivalent to the value of the *employee* contributions. On the other hand, this is not, and

cannot be, the case if the comparison is made with the combined employer-employee contributions. I think that the latter conclusion can safely be said to be "obvious," because the older workers at the start of the system received far more in benefits than the employer-employee contributions would "purchase." Therefore, since the system is established on a self-supporting basis, some persons must get benefits that have a value less than the combined employer-employee contributions, and this can therefore only be the young new entrants.

The authors, however, conclude that all participants receive, on the average, more than their money's worth, even though they assign the employer contribution directly to the individual employee. This seems to be an unreasonable conclusion, because, a priori, how can everybody get more than his money's worth when the system has no additional sources of financing other than the worker and employer contributions? This certainly brings back memories of the Ponzi game! The explanation arises from the authors' use of an unduly low interest rate in their basic calculations, namely, only $3\frac{1}{4}$ per cent, despite their dynamic assumptions for other economic elements. The use of a higher interest rate completely changes the picture—and thus the conclusions that the authors draw.

This reviewer also takes exception with the authors in their approach that the employer contributions are, over the long range, *individually* assignable to the particular employee. Granting that, on the whole, the full burden of payroll taxes falls on the workers in the long run (but really this does not seem so certain), this is no proof that the employer contribution is specifically and proportionately assignable to each individual worker. How could such specific assignment be justified if there were a different maximum taxable earnings base for the worker and for the employer? Can such specific individual assignment be justified when it is considered that the cost for many employer-financed fringe benefits, such as pensions, life insurance, and health or sickness benefits, is not similarly individually assigned but, instead, proportionately more of such cost goes for the older worker? Of course, there are examples where the cost of fringe benefits is proportionately higher for young employees, such as recreational facilities supplied for employees and their families and maternity benefits.

The authors seem to have the viewpoint that social security is most important from the standpoint of stabilization of the economy and related policies. This reviewer believes that a sound and adequate social security system should be established and that governmental program-planning-budgeting policies for purposes of economic growth and stabilization should be developed supplementary thereto. In other words, according to this belief of the reviewer, social insurance should be considered as a part of the ordinary economic life of the citizens of the country, just as are their purchases of goods and services (including private insurance). If such is not to be the case, why then should not other economic activities of the citizens be under governmental control, so that even more economic planning will be possible?

The authors come out strongly for financing the social security program through government contributions, obtained from general revenues. In fact, it would appear that the authors would prefer that the payroll tax should play, at

most, only a minor role in the financing of the program. This reviewer strongly opposes any government-contribution financing for the social security program, for reasons that he has developed in some detail in a paper, "Government and Pensions," presented at the Symposium on Private Pensions and the Public Interest, sponsored by the American Enterprise Institute for Public Policy Research, May 8-9, 1969.

Further, this reviewer believes that the social security contributions, when considered in combination with the benefit protection (as necessarily should be the case), are not regressive in nature and are no more of a burden on low-income persons than are prices of any other goods and services. For more detailed discussion of this point, see "Employee Social Insurance Contributions and Regressive Taxation," *Journal of Risk and Insurance* (December, 1967).

ROBERT J. MYERS

Cohen, Dean, Durand, Fama, Fisher, Lorie, and Shapiro, *Measuring the Investment Performance of Pension Funds for the Purpose of Interfund Comparison*, pp. xviii, 226, Bank Administration Institute, Park Ridge, Ill., 1968.

BACKGROUND

This publication sets forth the results of a study of methods used to measure investment performance commenced in 1966 by the Bank Administration Institute under the direction of an advisory committee of outstanding university faculty men, each of whom developed and wrote a section of the manuscript. Professor James H. Lorie, Director of the Center for Research in Security Prices of the University of Chicago, organized and directed the preparation of the text.

The purpose underlying the research study was to develop methods whereby the investment results of a given pension fund could be compared directly with the results achieved by other funds in such a manner as to differentiate between the relative abilities of the investment managers. A FORTRAN computer program for measuring investment performance was also developed and is available to members of the Bank Administration Institute and others, along with a comprehensive User's Manual.

It can be expected that this study will receive widespread publicity and will be accorded the status of an accepted standard by reason of its use by members of the Bank Administration Institute as well as the fact that so many recognized financial scholars participated in its preparation.

SUMMARY

The study looks into five major problems—measuring rates of return, estimating the risk, classifying pension funds, classifying assets, and valuating assets.

Measuring Rates of Return

The study concludes that rates of return should be based on the market value of the fund's assets. It is shown that the internal rate of return is a dollar-weighted rate that measures the performance of the fund rather than that of the fund's manager, since the timing and amounts of cash flows to the fund are not

usually controlled by the fund manager. An example is given of a single manager handling two funds who elects to invest each fund in the same securities in the same proportions. Fund A receives a large payment on January 1, after which the securities appreciate rapidly in value for six months. Fund B receives a large payment on July 1, again allocated among the same securities in the same proportions, and these securities then depreciate rapidly for the remainder of the year. Clearly, the internal rate of return for Fund A will be substantially greater than that for Fund B, and yet the fund manager's skill is identical, because exactly the same manager is involved. It is the timing of the contribution payment that produced a lucky result for Fund A. This example has some puzzling aspects, however, if one assumes that a knowledgeable manager will base his decision as to the particular securities and proportions that are best for a fund on the relationship between their current market price and his assessment of their long-range value. Thus a significant swing in the market should cause fund managers to review and change their previous decisions, and so the poor comparative performance for Fund B may merely reflect the fund manager's mistake in not changing his investment decisions along with the change in the market.

The committee recommends the use of time-weighted rates of return for the purpose of measuring performance of managers or trustees of pension funds. The internal rate will, of course, continue to be essential as a measure of a fund's actual performance and in determining the gain or loss from interest.

The ideal time-weighted rate of return is defined in the study as the weighted arithmetic average of the internal, continuously compounded rates of return for each subinterval whose boundaries are the dates of cash flows. The average, continuously compounded rate is finally converted to an annually compounded rate, so that the process is equivalent to a geometric averaging of annually compounded rates. Because of the requirement of a market valuation on the date of each cash flow, this ideal method for determining the time-weighted rate would be impractical for most funds. The study demonstrates, however, that only small distortion results (1) if the internal rate of return is calculated for each month, using the actual market value of assets each month and the precise timing of cash flows, or (2) if the time-weighted rate of return at the end of each quarter is calculated by the use of the Fisher regression method for estimating the asset values at the point of cash flow within the quarter.

Estimating the Risk

Since higher rates of return are considered to be associated, in some general fashion at least, with the assuming of a greater risk of loss, even time-weighted rates are strictly comparable only for funds which have taken comparable risks. Here risk is defined as "the relative uncertainty of future value or return." The study concludes that the best measurement of risk is variability in the historic rate of return, although, as to the long run, this choice is admitted to be somewhat questionable and deserving of special attention in future research. Unfortunately, there is no consideration given to the connection, if any, between "risk" as a causal factor explaining the higher yield for a particular security and

"risk" as a hazard to be minimized, even at the sacrifice of some potential yield, in the investment of a pension fund. The two concepts would not seem to be identical, and the type of risk measured by historic variability in yield may have very little bearing on whether a pension fund can or cannot meet its obligations in full.

The committee has concluded that the best measure of historic variability in the rate of return is the mean absolute deviation. Essentially, this selection is necessary because one of the underlying assumptions is that the logarithms of security price changes will not follow the normal distribution but, rather, for most securities, will follow some distribution falling between the normal and Cauchy distributions, and, since such distributions would have infinite variance, the sequence of standard deviations computed for a continuously increasing sample could not be expected to converge to a limit.

Classifying Pension Funds

It is concluded that funds can be classified in sufficiently homogeneous categories for the comparison of investment performance: first, as between profit-sharing funds, the trustee portion of split-funded plans (presumably because the trustee may have been instructed to take higher risk by reason of the fixed-income investments not in his fund) and pension funds; and, second, by the type of investment responsibility, that is, full responsibility given to trustee solely, trustor solely, or both jointly, those cases where there is a requirement as to a specific ratio (or limit) of equities to nonequities, and all other cases.

Investigations as to the effect of such things as size, age, rate of growth, and unpredictability of payments into and out of the funds did not indicate any important effect on the performance of the funds, so that separate categories were not recommended but further research on the question of how these other factors affect the comparability of fund performance is suggested.

Classifying Pension Fund Assets

Here the committee recommends the following six categories:

1. Common stocks and warrants
2. Assets convertible into common stocks
3. Cash and cash equivalents (securities maturing within one year)
4. Other fixed-income assets, chiefly bonds and mortgages
5. Assets purchased at the direction of the trustor
6. All others, including real estate, commodities, futures, puts and calls, etc.

The study concludes that the rates of return for the various categories are not too significant. It is the rate of return on the total fund that is all-important in any performance comparison.

Valuation of Pension Fund Assets

Market values are always used. Where quotes are not readily available, such as for privately placed investments, estimates as to the probable proceeds if sold currently are to be used. Clearly, uniformity is desirable, and the suggestion is

made that the Bank Administration Institute or some other organization in the long run makes available uniform methods for estimating the market value of assets. Accrual accounting is unanimously recommended, despite the fact that cash accounting is common among bank trustees. As a practical matter, it is concluded that cash accounting has an insignificant effect on the results produced by the recommended method for the direct comparison of trustee performance.

Appendix I contains a full-scale analysis of the formulas employed in the development of time-weighted rates of return, including the Fisher regression method and the linked internal-rate-of-return method.

Appendix II covers computational procedures using the data on contributions to, withdrawals from, and market values of specific pension funds. Appendix II also contains technical comments regarding computer procedure.

Appendix III covers an empirical study of the errors in the estimated time-weighted rates of return, based on the assumption that ideal data would consist of a complete market valuation of the fund at the time of each cash flow. The results of this empirical study indicated that both the regression method and the linked internal-rate-of-return method provide a more accurate estimate of the time-weighted rate of return than does the internal rate of return. The regression method appeared to be superior to the linked internal-rate-of-return method for any given interval if detailed data on the dates and amounts of contributions and withdrawals are available. Lack of such detailed data reduces the accuracy of both methods, and neither method provides satisfactory results for funds that have large contributions or withdrawals unless the market value of the fund is found at such times. It is concluded that the error inherent in the regression method appears to be negligible if detailed data on dates and amounts of contributions and withdrawals are used and if funds are valued at least quarterly and whenever there is a large contribution or withdrawal (10 per cent of the fund or more). For the linked internal-rate-of-return method, monthly valuations are required to obtain the same negligible error factor. Both methods were found to provide accurate estimates as to mean absolute deviation and standard deviation.

This appendix also includes tables showing the various error rates. While these tables seem to suggest that annual and semiannual valuations result in unreasonably large errors, they can be interpreted as showing that even the annual valuations produce reasonable results where the annual net rate of contribution is fairly small, say, less than 10 per cent of the fund.

Appendix IV contains a "proof" that the internal rate of return is a dollar-weighted rate, based on the approximation of $(1 + i)^t$ by $(1 + it)$. This would appear to be primarily "filler" material and is neither mathematically rigorous nor convincing.

Appendix V contains a theoretical discussion of the multiple-linkage method for regularly estimating the market value of private placements. This method consists of assigning a quality rating to the private placement, finding the current market price of money for major quality-rating groups, adding a yield

differential for industry category plus private-placement premium, and adjusting for vulnerability to call and for maturity, with summation of these adjustment factors to obtain the pricing yield, which can then be used to determine the current asset value.

The final section of the study is a Supplement covering recent developments in the field of investment risk. This section covers the concept of risk in relation to portfolio selection; quantification of risk, including its separation into diversifiable and undiversifiable risk; the concept of portfolio efficiency; and evaluation of portfolio performance in relation to naively selected efficient portfolios. The risk supplement is well organized and clearly written and provides an excellent overview of the topic. Much of the theoretical work underlying this presentation has appeared in articles in various technical journals, many of which are listed in "A Guide to the Literature" at the end of the Supplement. (The Risk Supplement is available separately, 1968 BAI, 34 pp., \$5.00.)

CRITICAL ANALYSIS

While this study is certainly monumental in scope and filled to the brim with authority (and carries a price tag of \$100 per copy), there are certain areas where even the authorities cannot reach agreement and other areas where a fussy attention to detail appears to be carried to the extreme. For example, the conclusion that the performance of a pension fund can only be determined accurately by having daily market valuation or by the use of fairly complex regression techniques seems needlessly cumbersome, considering the fairly crude manner for classifying the funds and the estimates necessary to value some of the assets. The inconsistency between a continuously compounded rate and the use of the trading day, rather than calendar day, as the basis for security price changes is ignored entirely. Also, no recognition is given to the possibility that the past performance of a pension fund might not be wholly attributable to the particular institution involved, since it might be indicative of a particularly brilliant, or shoddy, performance on the part of some individual who has since left that organization, whether physically or mentally. In short, the assumption of a constancy of performance and a historic stationarity of both personnel and purpose does not appear realistic.

Much of the theoretical research leading up to the study has been based on the assumption that the logarithms of security price changes are independent, random variables. Thus, in large part, the study is grounded on the random walk theory. A number of experts disagree with that theory, and a contention that security price changes are independent and random runs counter to both common sense and fact (i.e., seasonal price patterns, long-term market trends, panics, etc.). Furthermore, it is at least questionable whether a unimodal curve of the "stable Paretian" family of distributions actually fits the data much better than the normal curve; both appear to miss the mark by a wide margin. In any case, the cumulative distribution function for the symmetric stable distribution that most closely approximates the logarithm of the price variations of most common stocks is so close to the normal distribution function that the unsettling implications of assuming an infinite variance seem unnecessary.

Perhaps the most controversial of the conclusions reached by the study is that the best way to estimate the degree of risk assumed by a fund manager is to measure it *ex post facto* by use of the mean absolute deviation. Clearly, if this measure of dispersion is available, it has some bearing on the degree of "risk." Equally clearly, however, this measure of dispersion falls far short of conclusive proof of potential future variability, and such variability need not be a risk that is undesirable for a pension fund to take on. For example, a pension fund advancing in value at a rapid, nonconstant rate would be assigned non-zero risk, whereas a second pension fund, declining in value at a slow, constant rate, would be labeled "riskless" when measured by the mean absolute deviation. Clearly, if risk is to be associated with the probability of unfavorable occurrence or with loss of capital, it is the declining portfolio which, by definition, should be more risky. For this reason, downside vulnerability would seem to be a more realistic measure of risk, and even this concept might be further modified so as to ignore a modest downturn in value following on the heels of a substantial rise in value. Then, too, another risk for pension funds is that a "riskless" portfolio may only serve to assure the payment of constant benefits that are declining so rapidly in purchasing power as to be meaningless in the long run; that is, some of the risk that is avoided by a pension fund through risk-free investment may just be passed on in full to the sponsoring employer.

The cost of calculating the numbers representing past investment performance cannot be justified as a mere theoretical exercise. Obviously, performance results will be used from time to time as the basis for deciding to change trustees or investment advisers. The BAI study contains no suggested guides for such applications, but one probable result of its publication is that more and more attention will be devoted to the investment performance of pension funds. To the extent that this may result in ever faster short-term trading, it might be deplored. To the extent that the long-run result may be greater funds and greater benefits to the participants, it can indeed be praised.

PAUL H. JACKSON

Chin Long Chiang, *Introduction to Stochastic Processes in Biostatistics*, pp. xvi, 313, John Wiley & Sons, Inc., New York, N.Y., 1968.

For several years the *Year Book* of the Institute of Actuaries has contained an essay entitled "The Growth and Scope of the Profession." In this essay certain landmarks in the history of actuarial science are identified. The construction by Edmund Halley in 1693 of the Breslau life table and the construction by Richard Price of the Northampton table in 1783 are singled out in this essay as two key contributions to the development of actuarial science. Few actuaries would quarrel with this judgment, for the life table has proved to be a marvelous tool for solving actuarial problems. It would be natural to fix the birth of actuarial science as occurring simultaneously with the genesis of the life table. Since the founding of the profession, training in the construction and the use of life tables has been an important part of the education of actuaries.

Despite the historical priority of their interest in life tables, actuaries are no longer the only scientific group that employ life tables in their work. Biostatisticians, demographers, and reliability engineers not only use life tables but they are making significant contributions to the methodology of life-table construction.

It would be fair to say that most of the recent actuarial research that is related to life tables has been in the field of graduation. Relatively few actuarial papers have been devoted to examining death as a random process and to studying life-table construction as a statistical estimation problem. Chiang's book should be helpful to those actuaries who have a serious interest in learning of the progress being made in biostatistics in applying ideas from the theory of stochastic processes to illness and death and in viewing life-table construction as a statistical estimation problem.

Actuaries will rather naturally turn first to Part 2 of Chiang's book. This part contains four chapters devoted to life-table topics that are traditionally considered within the scope of actuarial science. These chapters draw heavily on earlier papers by Chiang, which have already been reviewed in this journal (*TSA*, XIV [1962], 558-59). In chapter ix the actuarial reader will find a rather conventional approach to the life table plus some comments on techniques for constructing life tables from census data. Some readers may be mildly disappointed that the new iterative methods for constructing life tables from census data are not mentioned and that the construction of abridged tables is not developed so as to include some of the most recent methods for using standard tables. In this chapter, as elsewhere, some actuarial readers, accustomed to the discipline of the International Actuarial Notation, may be annoyed to see familiar numbers identified with new symbols. For example, the central death rate is a capital rather than a lower case m in the Chiang book.

Chapter x is titled "Probability Distributions of Life Table Functions." The patient actuarial reader, who will sharpen his skill with probability generating functions, will find much of this chapter a delight. Unfortunately, in the final section of the chapter where the distribution of the observed expectation of life is considered, the development becomes rather sketchy. The reviewer is still a little puzzled about exactly which statement was intended to prove to him that the distribution of the observed expectation of life approaches a normal distribution as the number of lives under study increases (as is stated on p. 239).

Chiang devotes his chapter xi to a development of multiple-decrement theory, which he relabels "the theory of competing risks." Once again actuarial readers must accustom themselves to different notation and to different nomenclature. For example, rates of a decrement in Jordan's textbook are called net probabilities by Chiang. The bother of learning new terminology and notation is rewarded, however, for Chiang extends the methodology of the analysis of life tables by cause of death, a topic whose present state is due in part to the work of T. N. E. Greville, F.S.A.

Chapter xii will probably be of greatest interest to a practicing actuary, for

in this chapter Chiang discusses the problem of estimating the probabilities of death when nonmortality decremental forces are at work on those exposed to the risk of death. In Chiang's terms he is concerned with cases lost to medical follow-up. To actuaries the problem is one of withdrawing policyholders. The problem of incomplete observation periods is also studied. Cases whose observation period is incomplete because of the arbitrary ending of the observation period are called "enders" by actuaries and "withdrawals" by Chiang. The classical actuarial mortality estimation method is relegated by Chiang to a footnote on page 274. Chiang's approach is to find maximum likelihood estimates of the probability of death, using a constant force of mortality assumption over each age interval being investigated. The remainder of the chapter is spent in adapting the known asymptotic properties of maximum likelihood estimates to this special case.

Chiang devotes not a single sentence to graduation. At first this will strike an actuarial reader as a strange omission in this book devoted in part to life-table construction. However, one must remember that Chiang is a statistician from the classical mold and that a smoothing process without a statistical basis must seem to him to be outside the scope of his book, and, as a non-Bayesian, the Bayesian justification of graduation must also seem outside the proper scope of biostatistics.

Part 1 of the book is somewhat removed from the mainstream of actuarial mathematics. Chapter i provides a rapid introduction to some salient ideas from probability that are utilized later. Chapter ii reviews the application of the probability generating functions and illustrates these applications by a discussion of simple branching processes. This reviewer found that several of the problems associated with these early chapters provided significant new insights into the subject matter under discussion. He must also confess that he had forgotten, until reminded by Chiang, how neat some limiting distribution theorems are, using probability generating functions and discrete random variables, when compared to the more general formulation of the same theorems in more advanced probability books. The third chapter retraces the development of the distributions associated with a Poisson random process from the basic axioms for that process and also develops several standard distributions closely related to the Poisson process. Because of the key role played by the Poisson process in collective risk theory, this chapter will be familiar to many actuaries.

Beyond chapter iv of Part 1 Chiang will lead his actuarial readers into increasingly unfamiliar ground. In his attempt to study a general illness-death process with a finite number of illness states, Chiang found it necessary to present material on finite Markov processes with a continuous time parameter. Although this material is available elsewhere, Chiang has performed a valuable service by preparing a self-contained exposition of the ideas from stochastic processes that seem, at least potentially, to have the greatest chance of success in building realistic models of illness-death processes.

A reviewer traditionally points out minor weaknesses in a book and judges the author's selection of topics by his own ideal list of topics, which he is not

forced to define. In keeping with this tradition, there are several points in this review which express negative attitudes toward Chiang's book. Yet this should not obscure the central point that many ideas are being developed within the intersection of biostatistics and stochastic processes and that these ideas may be very relevant to actuarial science. There is no better introduction to these ideas than is provided by Chiang's book, and it is recommended to actuaries who seek to be informed on activity in closely allied fields.

JAMES C. HICKMAN

*O. D. Dickerson, *Health Insurance* (3d ed.), pp. xxiii, 773, Richard D. Irwin, Inc., Homewood, Ill., 1968.

Health Insurance is a college-level textbook on both private and public health insurance in the United States. Professor Dickerson also hopes that it will be used as a reference book. In spite of this reviewer's preconceptions, he was pleasantly surprised to find this book easy to read, somewhat fascinating in spots, and, generally, quite interesting and stimulating.

For the person who does not have the time or the inclination to sit down and read this book in its entirety, it should be mentioned that the Table of Contents provides a good outline. This is followed by a complete listing of the various charts (37) and tables (105) appearing in the book. For the serious student and researcher the author has provided a bibliography at the end of each chapter—in addition to the General Bibliography—as well as ten technical appendixes at the end of the book.

The first edition (1959) of this book was reviewed by Allen L. Mayerson (*TSA*, XI, 1134–36), and many of his suggestions for improving it are reflected in this third edition. Whatever the reason may be, there was no review of the second edition by the Society of Actuaries.

In reviewing this new edition, I made a comprehensive comparison with the 1959 edition and a brief comparison with the 1963 edition. These comparisons reveal that Professor Dickerson has done a prodigious amount of research and selection in making these revisions. They also show that he was not content to make only those revisions that were required to bring this book up to date but that he also has tried to improve its over-all structure. In fact, this third edition might be likened more to a "third generation" book rather than simply a "third edition." Just a few illustrations are the discussions relating to Medicare, the new social security amendments (1965 and 1967), and controversial types of health coverages, such as dental and vision care. There are also two full chapters devoted to the important matter of problems and issues in medical expense and disability income coverages. These two chapters, along with similar discussions elsewhere, add a certain dynamic quality to this book by virtue of its concern with the future of health insurance.

Of course, no review would be complete without some mention of the shortcomings that this book, like any other book, is expected to have. In this case, some of these shortcomings appear to be related to the problem of writing a

dynamic book that should serve well both as a text and as a reference. The definitions of difficult concepts are handled pragmatically—which ought to be an effective way to communicate these ideas to the student—and some readers might accuse the author of oversimplifying. The Index suffers from the omission of some important concepts, and this might inconvenience a researcher. A few readers might also feel that important considerations have been omitted in certain of the discussions. The author has injected his own opinions in some of the discussions, and, while these might stimulate the student, many readers may not agree with these opinions.

On the other hand, some of these shortcomings probably stem directly from the complexity of the subject matter itself, complicated further, perhaps, with the pressure on Mr. Dickerson to meet his press deadlines. In particular, and for whatever the reason may be, Mr. Myers did not have the opportunity to review the social security and Medicare material contained in this third edition prior to its publication. Consequently, quite a number of incorrect figures impair the usefulness of chapters iv, vi, vii, and xvi, and this, of course, is unfortunate.

In conclusion, while *Health Insurance* is not a final authority with respect to this subject—if for no other reason than by virtue of the sheer complexity of the subject itself—it is a valuable textbook on health insurance in the United States. Mr. Mayerson wrapped up his review with a recommendation that is still appropriate in the case of this third edition: “It is a volume which should have a place on the bookshelf of every actuary and college instructor concerned with health insurance.”

THOMAS C. BARHAM III

SELECT CURRENT BIBLIOGRAPHY

In compiling this list, the Committee on Review has digested only those papers which appear to be of direct interest to members of the Society of Actuaries; in doing so, the Committee offers no opinion on the views which the various articles express. The digested articles will be listed under the following subject-matter classifications: 1—“Actuarial and Other Mathematics, Statistics, Graduation”; 2—“Life Insurance and Annuities”; 3—“Health Insurance”; 4—“Social Security”; 5—“Other Topics.”

ACTUARIAL AND OTHER MATHEMATICS, STATISTICS, GRADUATION

Committee on Research, *Selected Bibliographies*, available on request from the Office of the Society of Actuaries or from the Secretary of the Committee on Research, Mr. D. G. Halmstad.

These bibliographies are prepared by the Committee on Research in furtherance of the responsibility for maintaining links with current thinking on the theory of risk, applications of various operations research techniques, new methods of statistical analysis, and such other disciplines as may lead to new and better methods of performing the work of the actuary. Revised in 1969, the bibliographies list books and articles selected by the Committee from the numerous references now available. The lists include references to the general theory with comments as to the degree of mathematical background assumed by the author as well as references of particular interest to actuar-

ies. Separate lists are available for the following seven topics: Bayesian Statistics, Multivariate Analysis and the General Linear Model, Operations Research, Risk Theory, Simulation, Systems Analysis, and Theories of Mortality.

Howard Raiffa and Robert Schlaifer, *Applied Statistical Decision Theory*, The MIT Press, Cambridge, Mass., 1968. (Reprint.)

This is a decision theoretic development of Bayesian statistics at the level of advanced calculus. The third part is the most complete reference of the distribution theory which is required when the prior distributions are from families of conjugate distributions.

Kyohei Sasaki, *Statistics for Modern Business Decision Making*, Wadsworth Co., Belmont, Calif., 1968.

This book provides a simple and straightforward introduction to Bayesian theory for advanced undergraduates and first-year graduate students in economics and business. The level and arrangement of the text material allow a student with knowledge of high school algebra to understand readily the theory and techniques used. Author's Preface.

LIFE INSURANCE AND ANNUITIES

* Paul A. Campbell, *The Variable Annuity*, pp. 71, published by the Connecticut General Life Insurance Company, 1969.

As indicated on its frontispiece, this book provides a survey of the development, environment, and future of the variable annuity.

Early chapters of the book trace the development of the variable annuity and outline the controversies that greeted its use as a means for providing pensioners with un-reduced purchasing power despite inflation. In a subsequent chapter, the book describes the legal restrictions and jurisdictional duplications that face the company selling variable annuities. Mr. Campbell then outlines the actuarial considerations of designing and pricing variable annuity products and the administrative procedures necessary for servicing them. The final chapters describe the potential market for variable annuities and the sales organization necessary to reach it.

Most of the book is designed to acquaint the "layman" with variable annuities. However, the appendixes include in more detail an outline of regulations in each state, a bibliography, and the premium, benefit, unit value, and reserve formulas for a straight life variable annuity.

* Roger F. Murray, *Economic Aspect of Pensions: A Summary Report* (General Series No. 85), pp. 132, 1968; published by National Bureau of Economic Research; distributed by Columbia University Press, New York, N.Y.

This study by Dr. Murray is the final one in a series of studies undertaken by the National Bureau of Economic Research. It was included in Volume V of the *Compendium on Old Age Income Insurance*, published by the Joint Economic Committee of the Congress of the United States. Dr. Murray examines the characteristics and financing of pension programs, both private and public, over the period 1940-1980. The review is from the standpoint of an economist and centers on the effect of pension plans on capital formation, personal savings, and the security markets. All funded plans, insured and trustee, are included in the analysis. Evidence is presented that suggests that private pensions have matured and will have less effect in future capital formation than they have in the past, whereas the pension funds of state and local governments over the

next ten or twenty years may have a major impact on capital markets. Private pensions are shown to have had the effect of increasing personal savings in the past, with a similar effect predicted for the future. On the other hand, private pension funds had no noticeable effect on share prices of securities, even though the turnover rate of securities held by pension funds rose from 12 per cent in the ten-year period 1955-65 to 14 per cent in 1966 as a result of the emphasis on performance (mutual fund turnover rates increased from 19 per cent in 1955-65 to 33 per cent in 1966). The report is well documented and thoroughly researched. Actuaries dealing with any aspects of pensions will find this study of real value and interest.

* H. Robert Bartell, Jr., and Elizabeth T. Simpson, *Pension Funds of Multiemployer Industrial Groups, Unions and Nonprofit Organizations* (Occasional Paper 105), pp. 52, 1968; published by National Bureau of Economic Research; distributed by Columbia University Press, New York, N.Y.

The first part of this report consists of a paper by H. Robert Bartell, Jr., covering multiemployer and union pension funds over the period 1959-64. The paper contains a description of the funds as to industry, size of fund, rate of growth, number of individuals covered, assets per covered worker, and portfolio composition. The second part of the report is a paper by Elizabeth T. Simpson covering the funded pension programs of private, nonprofit organizations in the United States, including religious organizations, schools and colleges, voluntary hospitals, and the like. These plans are studied over the period 1958-64 with regard to the size of the funds, growth rates, portfolio composition, and rates of return on investments. Each of these papers presents facts on a specific type of fund not available in the general summary report of Dr. Murray.

* J. D. Hammond and A. L. Williams, *Essentials of Life Insurance*, Scott, Foresman and Company, Glenview, Ill.

This short volume is intended as an introductory text for courses in insurance as well as a tool for instructing insurance company personnel. The book may also be useful to the general public in understanding the basics of life insurance.

The book is primarily aimed at the sales aspect of life insurance. Without going into great detail, this work covers ordinary life insurance, annuities, group life insurance, industrial life insurance, pensions, and social insurance.

Life Insurance Business in Japan (1967), pp. 23, The Life Insurance Association of Japan, Tokyo, August, 1968.

This review of Japanese life insurance from its origins in 1881 to its important position today contains a wealth of information. The growth of life insurance up to the second world war is briefly outlined, followed by some detail of the vicissitudes of the wartime and immediate postwar periods and the manner in which the industry was re-established on a sound footing. There follows a general survey of the present situation with full details of new business, business in force, and asset distribution; the place of insurance companies among other financial institutions is also dealt with. There is some information about recent trends in sales, and mortality and interest bases are shown for typical endowment insurance premium rates, accompanied by some illustrative dividends.

Throughout, the descriptive material is supported by relevant statistical tables, and the pamphlet concludes with some international comparisons and tables of mortality rates and life expectancy according to Japanese National Life Tables for males for the years 1955, 1960, and 1967.

HEALTH INSURANCE

U.S. National Center for Health Statistics, *Persons Hospitalized by Number of Hospital Episodes and Days in a Year, United States, July 1965-June 1966*, pp. 51, Public Health Service Publication No. 1,000, Series 10, No. 50, Washington, February, 1969.

"With the exception of females in the 15-44 age range, an age span during which there are many hospitalizations for deliveries, the rate of hospitalization per 1,000 population increased with age, the female rate of hospitalization was approximately 50 percent higher than for males.

"A single hospital episode of 1-7 days was the most common pattern of hospital stay, with 63.8 percent of the persons hospitalized experiencing this pattern. The persons hospitalized during an average year represented 10 percent of the total population, and they experienced approximately 179 million hospital days, an average of 9.4 hospital days per person hospitalized during the 12-month period ending in June 1966."

U.S. National Center for Health Statistics, *Family Hospital and Surgical Insurance Coverage, United States: July 1962-July 1963*, pp. 43, Public Health Service Publication No. 1,000, Series 10, No. 42, Washington, November, 1967.

Data concerning the extent of hospital and surgical coverage are presented by size and type of family in relation to family income, education of family head, geographic region, residence, color, labor-force-participation status, and hospital expenses.

PERCENT DISTRIBUTION OF FAMILIES AND UNRELATED INDIVIDUALS COMPLETELY COVERED BY HOSPITAL OR SURGICAL INSURANCE

INCOME	COMPLETE HOSPITAL COVERAGE					COMPLETE SURGICAL COVERAGE				
	Individual	2- Per- son Fami- lies	3- Per- son Fami- lies	4- Per- son Fami- lies	5+- Per- son Fami- lies	Individual	2- Per- son Fami- lies	3- Per- son Fami- lies	4- Per- son Fami- lies	5+- Per- son Fami- lies
Total	59.6	66.6	63.0	70.0	63.8	53.3	60.1	57.5	64.9	59.4
Under \$3,000	49.2	41.6	29.7	29.6	23.7	42.3	35.5	25.3	25.5	20.5
\$3,000-\$4,999	77.6	67.5	56.0	60.0	52.7	72.2	60.4	51.0	55.1	49.2
\$5,000-\$6,999	82.0	81.5	75.0	79.3	76.0	77.5	74.4	68.4	74.1	71.4
\$7,000-\$9,999	84.8	88.2	78.6	82.2	79.5	81.1	83.3	73.7	77.5	75.3
\$10,000+	81.3	90.2	80.4	82.6	81.4	74.2	85.1	74.6	76.4	75.2

U.S. National Center for Health Statistics, *Family Health Expenses, United States: July-December 1962*, pp. 41, Public Health Service Publication No. 1,000, Series 10, No. 41, Washington, November, 1967.

This report presents the average annual cost of personal health expenses per family and per unrelated individual by type of expenditure (hospital care, doctor care, dental care, medicines, and special and other health expenses) in relation to geographic region, color, family income, and education of the head of the family.

HEALTH EXPENSE PER FAMILY PER YEAR, BY TYPE OF EXPENSE,
SIZE AND COMPOSITION OF FAMILY, UNITED
STATES, JULY-DECEMBER 1962

SIZE AND COMPOSITION OF FAMILY	TYPE OF EXPENSE*					
	Total	Hospital	Doctor	Dental	Medicine	Special and Other
All individuals	\$181	\$ 40	\$ 57	\$ 24	\$38	\$22
Living alone	179	40	57	22	40	20
Living with relatives	188	40	55	31	32	28
All families	453	106	153	67	89	37
Husband-wife	472	111	161	69	92	38
Other male head	373	93	112	53	77	38
Other female head	323	71	100	51	71	30
2-person family	381	92	121	46	85	38
Husband-wife	400	97	128	47	89	39
Other male head	303	73	91	45	65	29
Other female head	304	69	93	42	70	31
3-person family	442	102	153	65	87	35
Husband-wife	463	108	163	66	90	36
Other male head	441	128	129	42	98	44
Other female head	288	52	87	61	63	26
4-person family	495	110	170	86	91	38
Husband-wife	507	114	176	87	93	37
Other male head	492	93	145	112	86	56
Other female head	347	65	108	65	69	40
5+ -person family	529	126	186	83	96	38
Husband-wife	538	127	190	85	97	39
Other male head	519	126	160	81	92	61
Other female head	400	106	132	51	85	25

* Expense per family per year.

U.S. National Center for Health Statistics, *Prevalence of Selected Impairments, United States, July 1963-June 1965*, pp. 78, Public Health Service Publication No. 1,000, Series 10, No. 48, Washington, November, 1968.

"In the civilian, noninstitutional population it is estimated that there was an average annual number of about 5.4 million visual impairments, 8.5 million hearing impairments, and 1.3 million speech defects. . . . There were also an estimated 1.5 million cases of paralysis, 2.0 million cases of missing extremities, and 17.7 million orthopedic defects during this period. Cataracts were the leading cause reported for visual impairments. . . . Vascular lesions affecting the central nervous system were the major cause of paralysis; while injury constituted the major cause of both missing extremities and orthopedic defects."

U.S. National Center for Health Statistics, *Disability Days, United States, July 1965-June 1966*, pp. 55, Public Health Service Publication No. 1,000, Series 10, No. 47, Washington, October, 1968.

"The rate of restricted activity due to acute and chronic illness and injury for the average person during the 12-month period was 15.6 days. Included in this rate were

6.3 days spent in bed. Currently employed persons were absent from work an average of 5.8 days due to illness or injury. The average schoolage child (6-16 years) lost 5.2 days of school." Data are presented by age, sex, residence, geographic region, employment status, family income, occupation, and industry.

U.S. National Center for Health Statistics, *Current Estimates from the Health Interview Survey, United States, July 1966-June 1967*, pp. 51, Public Health Service Publication No. 1,000, Series 10, No. 43, Washington, January, 1968.

This report presents data "on the incidence of acute illnesses and injuries and associated disability days; the percent of the civilian, noninstitutional population with one or more chronic conditions; the number of persons injured and associated disability days; the number of hospital discharges; the number of disability days associated with illness; and the frequency of physician visits."

U.S. National Center for Health Statistics, *Volume of Physician Visits, United States, July 1966-June 1967*, pp. 60, Public Health Service Publication No. 1,000, Series 10, No. 49, Washington, November, 1968.

"During July 1966-June 1967, an estimated 831.1 million physician visits, or 4.3 per person per year, occurred among the civilian, noninstitutional population. About 71.8 percent of these visits took place in the physician's office, where the average cost of a visit was \$7.80. A general practitioner was consulted in about 64.0 percent of all office visits; the average cost for this type of visit was \$6.60. An estimated 31.9 percent of the population had no visits during the year prior to interview. About 62.8 percent of the population had from 1 to 12 visits in a year, and 4.3 percent had 13 visits or more."

U.S. National Center for Health Statistics, *Limitation of Activity and Mobility due to Chronic Conditions, United States, July 1965-June 1966*, pp. 66, Public Health Service Publication No. 1,000, Series 10, No. 45, Washington, May, 1968, and *Chronic Conditions Causing Activity Limitation, United States, July 1963-June 1965*, pp. 48, Public Health Service Publication No. 1,000, Series 10, No. 51, Washington, February, 1969.

Examination of the population with activity limitations indicates concentrations "in older age groups, among nonwhite persons, in lower income and education groups, among persons not in the labor force, among residents of the South Region, and among persons living outside metropolitan areas."

"Most often reported as causes of limitation were (1) heart conditions, (2) arthritis and rheumatism, (3) mental and nervous conditions, (4) impairment of back and spine (except paralysis), (5) hypertension without heart involvement, (6) impairments of lower extremities and hips (except paralysis and absence), and (7) visual impairments."

U.S. National Center for Health Statistics, *Nursing and Personal Care Services Received by Residents of Nursing and Personal Care Homes, United States, May-June 1964*, pp. 41, Public Health Service Publication No. 1,000, Series 12, No. 10, Washington, September, 1968, and *Use of Special Aids in Homes for the Aged and Chronically Ill, United States, May-June 1964*, pp. 32, Public Health Service Publication No. 1,000, Series 12, No. 11, Washington, December, 1968.

The level of care given to residents of nursing and personal care homes is described in terms of their health and related characteristics. Special aids—wheel chairs, eyeglasses, hearing aids, braces, crutches, artificial limbs, and walkers—are discussed with regard to such characteristics as age, sex, mobility status, type of service provided in the home, chronic diseases and impairments, and length of stay.

SOCIAL SECURITY

R. J. Myers and M. A. Lannen, *Comparison of Actual Experience under OASDHI System with Short-Range Cost Estimates*, pp. 3, *Actuarial Note No. 48*, Social Security Administration, Washington, December 1968.

This note compares actual experience for fiscal year 1968 under the Old-Age, Survivors, and Disability Insurance system and under the Medicare program with the short-range cost estimates given in the 1968 Trustees Reports. The balance in each of the four trust funds at the end of each fiscal year during 1960-68 is compared with the estimate made in each of the same years. The actual balances in the OASI and DI Trust Funds on June 30, 1968, were almost exactly what had been estimated. For the HI Trust Fund, however, higher utilization of services than had been estimated caused actual outgo to exceed the estimate by 11 per cent, and a delay in the reimbursement from the General Fund for uninsured persons caused actual income to be 9 per cent lower than estimated; as a result, on June 30, 1968, the balance in the fund was only 66 per cent of the estimated balance. The SMI Trust Fund balance on June 30, 1968, was about 88 per cent of the estimate, primarily because about 15 per cent of the government contributions was delayed until after the close of the fiscal year. *Actuarial Note No. 47*, published in October 1968, presented similar comparisons for both fiscal year 1967 and calendar year 1967.

OTHER TOPICS

* A. Brite (ed.), *Insurance Periodical Index for the Period July 1967-June 1968*, pp. 142, Special Libraries Association, Boston, 1968.

"This index attempts to include all articles appearing in the prescribed list of titles indexed. As a rule news items are not indexed although those of special significance may be. Because of space limitations in the monthly index, it is not possible to index sales articles of a nontechnical nature."

The index is divided into four sections—an articles section covering life and health lines as well as property lines; a policy changes section; a company changes section; and an author index. Thirty-two periodicals are indexed. There are useful cross-references to aid the user in locating items under study.

The editor notes that starting in January 1969 the index will be published monthly by *Best Review: Life/Health* and *Best Review: Property/Liability*.

* *A List of Worthwhile Life and Health Insurance Books*, 1969 ed., pp. 80, Institute of Life Insurance, Health Insurance Institute, New York, N.Y., 1969.

This list is composed of a selection of books currently in print which are available from commercial publishers and other sources. The books listed are a representative selection of those of interest primarily to three groups: the general public, students of insurance, and those within the insurance business. The books are listed under the following major headings:

Uses of Life and Health Insurance
Textbooks on Life and Health Insurance
Studies on Life and Health Insurance
Careers
Information for Company Management
Information for the Agent

Histories of Life Insurance
Annual Reference Sources
Background Statistics
Periodicals on Life and Health Insurance
Additional Types of Life Insurance
Additional Types of Health Insurance
Related Subjects

U.S. National Center for Health Statistics, *Marriage Statistics Analysis, United States, 1963*, pp. 39, Public Health Service Publication No. 1,000, Series 21, No. 16, Washington, September, 1968.

"This is a study of changes in age-specific marriage rates, age distributions of unmarried women, and trends in marriages and marriage rates for 1940-63. An analysis is made of the differences in trends of marriage rates by sex, age, and mental status between 1960 and 1963. Also, a description and classification are presented of the types of nonsampling errors found in the marriage statistics for 1963, with estimates of the proportions of cases affected by nonresponse and items not appearing on some record forms."

U.S. National Center for Health Statistics, *Comparability of Age on the Death Certificate and Matching Census Record, United States, May-August 1960*, pp. 53, Public Health Service Publication No. 1,000, Series 2, No. 29, Washington, June, 1968.

"Age agreement between the death certificate and the census record for the same individual was relatively higher for white than for nonwhite—especially older nonwhite—decedents, and slightly higher for male than for female decedents. Levels of comparability were lower in the Northeast Region for white decedents and in the South for nonwhite decedents than in other regions. Age comparability was higher among persons dying from accidents, poisonings, and violence than among those dying from major cardiovascular-renal diseases. Based on this study, the accuracy of the age-specific death rate as a measure of nonwhite mortality risks at ages 45 years and over is open to question."

U.S. National Center for Health Statistics, *Socioeconomic Characteristics of Deceased Persons, United States, 1962-1963 Deaths*, pp. 38, Public Health Service Publication No. 1,000, Series 22, No. 9, Washington, February, 1969.

Statistics are presented on persons who died during 1962 and 1963 by educational attainment, income level, age, sex, color, place of residence, living arrangement, and mental status.

U.S. National Center for Health Statistics, *Hearing Levels of Adults by Education, Income, and Occupation, United States, 1960-1962*, pp. 41, Public Health Service Publication No. 1,000, Series 11, No. 31, Washington, May, 1968, and *Hearing Status and Ear Examination Findings among Adults, United States, 1960-1962*, pp. 28, Public Health Service Publication No. 1,000, Series 11, No. 32, Washington, November, 1968.

Data are presented on hearing thresholds of adults by education, income, and occupation. Comparisons with other published findings are included. Medical history questions about conditions which may affect hearing are considered. Four methods of determining hearing status are compared.

U.S. National Center for Health Statistics, *Visits for Medical and Dental Care during the Year Preceding Childbirth, United States—1963 Births*, pp. 60, Public Health Service Publication No. 1,000, Series 22, No. 4, Washington, May, 1968, and *Medical X-Ray Visits and Examinations during Pregnancy, United States—1963*, pp. 41, Public Health Service Publication No. 1,000, Series 22, No. 5, Washington, June, 1968.

An average of 11.5 visits for medical care were made by mothers during the twelve months prior to the birth of their children. There was little variation by age of mother, geographic region, or metropolitan status. Mothers made more visits for first than for later births, and the average number of such visits was highest for white mothers and those in high income or education classifications. X-ray visits are described in relation to various demographic characteristics.

REVIEWS FROM "THE JOURNAL OF THE
INSTITUTE OF ACTUARIES"*

Reviews in Vol. XCIV, Part 1, No. 397

Eric Chalmers, *The Gilt Edge Market*, pp. xiv, 182, W. P. Griffith & Sons, Ltd., London, 1967.

Jack Revell, *The Wealth of the Nation: The National Balance Sheet of the United Kingdom 1957-61*, pp. xvi, 484, Cambridge University Press, 1967.

E. Sverdrup, *Laws and Chance Variations: Basic Concepts of Statistical Inference*, Vol. I, pp. 397, xvii; Vol. II, pp. xi, 313, North Holland, 1967.

Reviews in Vol. XCIV, Part 2, No. 398

William G. Nursaw, *The Art and Practice of Investment*, 2d ed., pp. 155, Hutchinson, London, 1967.

N. Williams, *Linear and Non-linear Programming in Industry*, pp. x, 128, Pitman, London, 1967.

Michael Pilch and Victor Wood, *Pension Scheme Practice*, pp. 192, Hutchinson, London, 1967.

Porphyria: A Royal Malady, pp. vii, 68; articles published in or commissioned by the *British Medical Journal*, London, B.M.A., 1968.

G. H. Lawson and D. W. Windle, *Capital Budgeting and the Use of D.C.F. Criteria in the Corporation Tax Regime*, pp. 163, Tables, London, Oliver and Boyd, 1967.

David A. McL. Kemp, Margaret Sylvia Kemp, and Richard O. Havery, *The Quantum of Damages*, Vol. I: *Personal Injury Claims*, 3d ed., pp. xxxvii, 733, London, Sweet & Maxwell, 1967.

* The *Journal*, in addition to actuarial papers and discussion, contains digests of articles, papers and publications of actuarial interest, and "Notes on Other Actuarial Journals."