TRANSACTIONS OF SOCIETY OF ACTUARIES
1967 VOL. 19 PT. 1 NO. 53AB

BOOK REVIEWS AND NOTICES*

*Joseph M. Belth, *The Retail Price Structure in American Life Insurance*, pp. xix, 300, Business Report No. 40, Bureau of Business Research, Graduate School of Business, Indiana University, 1966.

Professor Belth, who is associate professor of insurance at Indiana University's Graduate School of Business, developed several years ago his own variant of the method for calculating the cost of insurance implicit in a life insurance contract. He produced a system applicable to a single policy year and also one designed to cover a period of years. More recently he gathered from life insurance companies of various types a large quantity of the data needed to apply his method to their contracts. This book describes the method, displays the results of applying it to the data, and sets forth the author's opinion on many general questions about the cost of life insurance to the American public.

A. THE METHOD

Professor Belth's two measures of policy cost are labeled, respectively, "Yearly Price per $1,000 of Protection" and "Level Price per $1,000 of Protection."

The nature of each of these indexes can most easily be studied by applying the Belth method to a policy that is entirely on a net basis, that is, assuming no expenses and no lapses, and maintaining identity as to mortality and interest between the basis used in applying the method and the actuarial basis of premiums and reserves. This reviewer has done this, using twenty-year term, ordinary life, twenty-payment life, and twenty-year endowment contracts on the 1958 CSO 3 per cent basis at issue age 50, assuming immediate payment of claims.

An actuary would be likely to define the yearly cost per $1,000 of protection in policy year t by the approximate formula

$$\text{Cost} = {}_tq\,(1+\tfrac{1}{2}i) = \frac{({}_{t-1}V+P)\,(1+i) - {}_tV}{1{,}000 - {}_tV/(1+\tfrac{1}{2}i)}\,.$$

Professor Belth's expression for the yearly price per $1,000 of protection would be

$$\frac{({}_{t-1}V+P)\,(1+i) - {}_tV}{1{,}000 - ({}_{t-1}V+P)\,(1+\tfrac{1}{2}i)}\,,$$

which is identical in the numerator but differs to a minor extent in the denominator.

Professor Belth's level price per $1,000 of protection is obtained by discounting both the numerator and denominator of his yearly price expression using pure endowment single premiums. Over an n-year period the level price be-

* 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*.

comes, under the conditions of a net policy, that is, assuming no expenses and no lapses,

$$\frac{\sum_{t=1}^{n} \frac{D_{t-1}}{D_0}[({}_{t-1}V+P)(1+i) - {}_tV]}{\sum_{t=1}^{n} \frac{D_{t-1}}{D_0}[1{,}000 - ({}_{t-1}V+P)(1+\frac{1}{2}i)]}.$$

The numerical results for the net policy described above are given at several policy durations and for the twenty-year level price in the accompanying tabulation, together with the attained-age values per $1,000 of the 1958 CSO mortality rate increased by a half-year's interest for comparison.

1958 CSO 3 PER CENT NET, IMMEDIATE PAYMENT OF CLAIMS, ISSUE AGE 50

POLICY YEAR	BELTH METHOD—YEARLY PRICE PER $1,000 OF PROTECTION				VALUE OF $1{,}015 \cdot q_{50+t-1}$
	20-Year Term	Ordinary Life	20-Pay Life	20-Year Endowment	
1	$ 8.92	$ 8.91	$ 8.93	$ 8.92	$ 8.84
2	9.77	9.77	9.76	9.77	9.67
3	10.68	10.68	10.69	10.69	10.58
4	11.70	11.69	11.69	11.70	11.56
5	12.78	12.80	12.80	12.79	12.64
10	20.13	20.13	20.14	20.15	19.75
15	31.79	31.79	31.80	31.79	30.84
20	50.78	50.78	50.80	51.19	48.36
Belth method—20-year level price	20.64	18.86	17.48	15.96	....

These level-price figures are in one case larger and in three cases smaller than $19.70, the net premium for twenty-year level term insurance at age 50.

Professor Belth devotes a good deal of space in his chapter v to the major problem that arises when a comparison between different plans of insurance is attempted. It will be noted from the table above that the level prices for the four plans shown are quite different. He suggests that different plans may, like apples and oranges, be inherently different, and he explores various ways to achieve some sort of comparability.

To this reviewer it seems that the level-price calculation suffers from a basic defect. The defect is that "price" in the author's concept is a mixture of two elements that are quite different from each other and that should not be thrown together in what is described as a highly refined method of price analysis. These two elements are (1) the individual policyholder's contribution to the fund which is forthwith divided among the beneficiaries of those who die during the current policy year and (2) the individual's contribution to the operating expenses, contingency reserves, and profits of the life insurance company.

This suggests that the problem could be eliminated or greatly reduced by subtracting from the yearly price per $1,000 of protection by the Belth definition the mortality rate on a modern select mortality table and comparing only the residue expressed in dollars. For example, in the net-basis illustration given earlier in this review, if the value of an attained-age mortality rate were to be subtracted from each yearly price, any logical necessity for weighting by the net amount at risk in arriving at the level price would disappear. The discounted value of the dollar amounts would be about the same regardless of plan except to the extent that genuine differences in expense and profit provisions are implicit in the contracts being compared.

It should be noted that the problem which the author recognizes when comparison is attempted between different plans of insurance will also be present, to a lesser degree, when comparing policies that are on the same plan of insurance but are on different reserve bases.

A different solution has been suggested by another actuary (Clair A. Lewis, F.S.A.) who has examined the theoretical and practical problems created by the author's level-price formula. Starting with the thesis that a policyholder at the beginning of a particular policy year establishes his right to one of two things by foregoing his current cash value and paying another premium instead—the right to a death benefit if he does not survive the year or the right to the year-end cash value if he does—Mr. Lewis concludes that the most satisfactory expression for level price over n years is

$$\frac{\sum_{t=1}^{n} \frac{D_{t-1}}{D_0} [({}_{t-1}V + P) - v \cdot p_t \cdot {}_tV]}{1{,}000 \sum_{t=1}^{n} \frac{D_{t-1}}{D_0}} .$$

In the special case in which neither expenses nor lapses are involved, the level cost by Mr. Lewis' formula will be the n-year level term cost regardless of the plan of insurance being tested.

The level price by the author's method discounts the yearly prices for probability of lapse as well as for probability of death and for interest. This reviewer believes that, although discounting for lapses does belong in a general study of life insurance company costs, it is not appropriate for the purpose that the author attributes to his method, which is analysis by a prospective policyholder of the desirability of purchasing his life insurance in a particular company. The reason is that a policyholder can control the persistency experience of his own policy. This is one of the questions which the author discusses objectively.

Another major problem is that the cost of participating life insurance cannot be known in advance because in practice it is highly unlikely that the dividends paid will closely resemble those illustrated at issue date. The author recognizes this problem also but consoles himself with the observation that there is a high correlation between the rank achieved in terms of current dividend illustrations and past histories. This reviewer considers the objection to use of current illustrations in the author's method or any other method to be more serious than Professor Belth maintains.

B. THE STATISTICS

The author has taken care to stress that his sample of companies is not a true industry cross-section. Possibly the original request for voluminous policy figures received response in relatively larger numbers from companies that had reason to be rather pleased with their net costs and from companies whose actuarial department staffs were large enough to spare the time for the project. All the same, the variations in cost displayed in the tables are striking.

The author exhibits comparisons by plan of insurance, by issue age, by policy size, by year of issue, by policy duration, and by company size. He also studies the cost patterns for dividend additions, in so-called specialty policies and in companies that operate without agency organizations.

C. THE AUTHOR'S OPINIONS

Nine major conclusions reached by the author are summarized in the following list, in a mixture of the author's and this reviewer's words and with the comments of this reviewer.

1. *Buyers are generally unaware of what prices they pay for life insurance. The Belth price-measurement system will solve this problem provided the regulatory authorities will co-operate by requiring completion of a much-enlarged Schedule M in the Annual Statement that will provide the data for application of the method.*

The objection to this argument is that, although it may be agreed that the author's method is superior to the traditional method of displaying net costs, it is nevertheless true that the traditional method is widely publicized and does show a large cost variation between companies. Furthermore, as indicated above, no method will reveal what the cost will be on the great majority of life insurance sales, those on a participating basis.

2. *Price competition in life insurance has not been effective.*

Professor Belth's analysis of this question by a statistical approach involving price differentials that exceed two or three standard deviations seems distinctly unsatisfying. After all, if the market price of pencils were 10 cents apiece, there is no doubt that a door-to-door salesman could sell *some* pencils even though he were to charge 50 cents apiece. But price competition can be considered to be effective if very few sales can be made at the extremes of price. The author finds that there are companies offering life insurance at prices that his method singles out as excessive, but he does not show that those companies make many sales at those points.

A more valid way to explore the question would be to compare the patterns of sales by age or by plan of Company A, whose prices are low at some points but high at others, with those of Company B, whose price pattern tends to be the reverse of Company A's.

3. *Some of the policy data (i.e., premiums, dividends, cash values, and particularly terminal dividends) are subject to substantial manipulation for the purpose of showing a competitive position more favorable than operating performance justifies.*

But if price competition is ineffective, what incentive is there for a company to engage in such manipulation?

4. *The appropriate device for improving effectiveness of price competition is a rigorous system of price disclosure through the Annual Statement and through a national computer program for analysis of the data furnished.*

There would still be major problems in conveying the results of the Belth method to prospective policyholders in terms that they would understand. Furthermore, the outlook is that existing confusion, such as it is, would be supplanted by a different kind of confusion arising from the problems already mentioned in comparing costs on different plans of insurance and at different ages.

5. *The implications of the recommended price disclosure are far reaching. Disclosure might have a damaging effect on many companies that would be indicated as being in the medium- and high-priced areas. Even if these comparisons did not reach the buying public, they might seriously discourage the agents and general agents of those companies.*

It is indeed difficult to understand how the substitution of a more refined, but necessarily much more complicated, system of price analysis could have any such effects as these.

6. *Widespread price disclosure might even undermine level premium life insurance because policyholders would be unhappy when they discover that the price per unit of protection tends to increase with increasing age.*

Since the major reason is that the risk itself (i.e., the mortality rate) increases with increasing age, this reviewer fails to see what damage would result from such recognition. Actuaries, who surely thoroughly understand that this is true, still buy level premium life insurance themselves. The reason may be that actuaries understand that it is equally true of nonlevel premium life insurance.

The author illustrates these theses by a hypothetical example at attained age 85. He does not help his cause by resorting to such an extreme even though he admits that it is a far-out situation.

7. *The level premium system tends to conceal from the policyholder the true facts about the price of his protection.*

If this is true it surely is not as serious a matter as the author suggests. People buy life insurance because they and their loved ones would be less happy without it than with it, not because they consider it inexpensive.

8. *Lack of effective price competition has been a major factor in the development of the shaky foundation upon which the recent boom in life insurance stocks has been built.*

This is a highly dubious and unsupportable conclusion. It is much more reasonable to suppose that the boom in life insurance stocks arose from recognition that in an era of rising interest rates and falling mortality rates stock companies were blessed with blocks of existing life insurance issued with premiums that, happily for their stockholders, proved to be more than ample.

9. *Lack of effective price competition may be partly responsible for the apparent relative decline of life insurance as a savings medium, for two reasons:* (a) *buyers may suspect that they are being overcharged and* (b) *without the spur of price competition companies may not have searched with sufficient vigor for more efficient ways of furnishing life insurance protection to the public.*

The difficulty with this argument is that, if the reported decline can be attributed to the effect of pricing, the inference must be that even without the aid of Professor Belth's method the public has successfully appraised the relative investment advantages of level premium life insurance and other available forms of saving.

Professor Belth is somewhat of a gadfly. Some might feel that it would have been better if the companies had not furnished the information that made his study and the publication of this book possible. This reviewer does not share that opinion. Instead he endorses the views expressed by W. George Pinnell, dean of the Graduate School of Business at Indiana University, in the Foreword to this volume: "While additions to the stock of knowledge may spring from a myriad of sources, our colleges and universities are specifically responsible for directing their energies and resources toward creative thought that pushes out the frontiers of knowledge. . . . [The author's] research effort has been carefully conceived, rigidly structured, and objectively implemented in a manner fully in keeping with high standards of scholarship. . . . This study adds significantly to the organized and articulated thought about an important contemporary problem."

E. J. MOORHEAD

*Joseph J. Melone and Everett T. Allen, Jr., *Pension Planning: Pensions, Profit Sharing, and Other Deferred Compensation Plans*, pp. 387, Richard D. Irwin, Inc., Homewood, Ill., 1966.

"The objective of this text is to present a comprehensive treatment of deferred compensation programs. While primary emphasis has been given to *qualified* pension plans, the text includes extensive coverage of other methods of deferring compensation such as profit sharing, tax-sheltered annuities, informal or nonqualified plans, and plans for the self-employed (H.R. 10). . . . In view of the importance of tax considerations in deferred-compensation planning, two separate chapters have been devoted to this subject. Moreover, tax consequences and implications are noted, wherever appropriate, in the balance of the material."

Emphasis is given to insured plans and the needs of small and medium-sized employers. Because of this deliberate orientation, the text is very weak in its treatment of uninsured trusteed arrangements and in the entire spectrum of group pension arrangements. The book was written to meet the needs of the educational programs of the American College of Life Underwriters.

The book has several features that fit it well for its intended use as a college-level text. It has both a comprehensive table of contents and an index. It is tightly written, extensively footnoted, and liberally sprinkled with topical headings and subheadings.

The first chapter provides a very good analysis of the economics of pension plans. The authors walk a nice tightrope between the traditional concept of a purely management decision and the current preoccupation with broad social forces. The chapter also depicts the interplay between the relative attractiveness of cash wages and fringe benefits depending upon the adequacy of cash wage levels at the particular moment of time.

The second chapter deals with plan design. It is both comprehensive and specific insofar as it applies to plans which are destined to be funded through the purchase of individual insurance policies or annuity contracts or the traditional group deferred annuity contract. The chapter covers other arrangements in generalities. There is very little discussion of variable annuities or cost-of-living benefits.

Chapters iii and iv provide a very readable discussion of funding considerations and the effect of funding methods on the incidence of costs. The terminology pertaining to the actuarial aspects reflects the thinking of the Committee on Pension and Profit-sharing Terminology, sponsored jointly by the American Risk and Insurance Association and the Pension Research Council, University of Pennsylvania.

Chapters v and vi provide an unusually detailed discussion of the federal tax aspects of pension plans. The authors have reached beyond the usual areas of federal income tax implications for employers and employees and have included estate tax and gift tax aspects of benefits flowing from qualified pension plans. The student may find some of this rather heavy going, but it is good material and worthy of his concentration.

Chapters vii through x deal successively with individual policy plans, group insured pension plans, trust fund plans, and selection of a funding instrument. In view of the focus of this text, the authors could have been forgiven if there was a slight emphasis on the strong points of the various vehicles offered by insurance companies. The reviewer was unable to detect such a bias. On the contrary, the authors seem to have leaned in the opposite direction. This is a natural consequence of any itemization of standard underwriting rules and policy provisions. For example, the authors may say that "the insurance company requires" or that some rule or regulation "must" be observed, without providing background that would show the reason for the underwriting procedure and hence its value to the sound operation of pension plans.

The authors' presentation of group coverages would have been improved if there had been a few paragraphs which commented on the flexibility of the group vehicles and the extent to which group contracts are tailored to the needs of the client. Because the focus of the book is on individual policies, which are discussed in chapter vii, the reader may be left with the impression in chapter viii that the same rules apply to group policies except where specific reference is made to differences. The treatment of group permanent, deposit administration, immediate participation guarantee, and separate account contracts are so limited as to leave the impression of rather stereotyped contract forms.

The authors use the unfortunate term "new money" in discussing investment-generation methods of allocating investment income and fail to discuss the important protection that this provides during periods of low interest rates. The discussion of transfer-of-fund clauses relies on the vague term "antiselection" to convey the need for special contractual provisions without any discussion of the possible impact on asset values, forward commitments, and problems in disposing of private placements. There is no discussion of the difference between the book-value concept of assets as used in the general investment account and the market-value concept of separate accounts.

Chapters xi and xii consider underwriting aspects of insured plans and plan installation and administration. These chapters are somewhat more complete than those found on these subjects in most pension texts and prepare the reader for some of the practical problems of installation that other writers have sometimes overlooked.

Chapters xiii and xiv deal with the specialty areas of profit-sharing plans and plans for the unemployed. These are well-written chapters and provide comprehensive coverage of the subject matter.

The last two chapters in the book are truly outstanding. Chapter xv is a very detailed discussion of nonqualified deferred compensation with emphasis on the legal aspects. Chapter xvi is a similarly detailed treatment of tax-sheltered annuities. These two chapters were contributed by Bernhart R. Snyder, C.L.U., of the New England Mutual Life Insurance Company.

J. DARRISON SILLESKY

* D. M. McGill, *Life Insurance* (rev. ed.), pp. xxi, 1023, Richard D. Irwin, Inc., Homewood, Ill., 1967.

The first edition of this book was reviewed in *TSA*, XI, 1129. This edition is probably the largest textbook on the subject; numerous footnotes refer the reader to other books and articles in which the various topics are discussed at even greater length.

The present edition has been expanded by the addition of chapters on types of life insurance carriers, organization and structure of life insurance companies, investments, financial statements, taxation of life insurance companies, and tax treatment of life insurance. Most of these added chapters are written by specialists, that on financial statements being by a member of the Society, Mr. Espie. The chapters which appeared in the first edition have been enlarged by discussions of a number of important topics, including nonproportional reinsurance, the *1959 Build and Blood Pressure Study*, the Commissioners 1960 Standard Group Table and 1961 Standard Industrial Table, variation of dividends by such things as sex and policy size, the fifth dividend option, and the new-money concept.

Except for incidental mention, there is no treatment of group annuities, presumably because the series of insurance books of which this is one includes a volume on pension planning.

As was noted in the review of the first edition, an unusually large amount of space is devoted to the legal aspects of life insurance. Discussion of policy provisions other than nonforfeiture values, dividends, and settlement options, instead of being brought together in one chapter as in most textbooks, is scattered through this section as parts of the general treatment of the legal principles involved. However, among the appendixes is a specimen policy form.

The inaccuracies noted in the previous review have been corrected. The author has failed to note, however, that Montana no longer requires the automatic premium loan provision.

JAMES E. HOSKINS

* M. H. Ingraham, with the collaboration of S. Eckler, *Faculty Retirement Systems in Canadian Universities*, pp. x, 92, University of Toronto Press and Les Presses de l'Université Laval, 1966.

This study has a broader appeal than might be indicated by the title. The author has focused attention upon the mobility of faculty personnel and the influence which this should have on the proper design of a retirement system. Most of his discussion is, therefore, equally applicable to other situations in which large numbers of professional persons are employed under conditions which permit ready transfer of their talents from one employer to another. Medicine, electronics, and data processing are examples which come quickly to mind.

The study is in the form of a report to the Association of Universities and Colleges of Canada, Canadian Association of University Teachers, and the Canadian Association of University Business Officers. Professor Ingraham makes frequent use of the first person singular, "to emphasize that many of the conditions and opinions are subject to the predilections, personal experiences, evidence, and reason that condition any single mind." This informal style permits a talented author to create interesting reading from a rather technical subject. The study was financed by a grant of the Carnegie Corporation of New York and was conducted under the direction of a steering committee representing the three Canadian associations.

The task was defined as follows:

1. To study the retirement annuity plans in force at Canadian universities and colleges, and relevant governmental social security measures;
2. To explore and report on suitable patterns and agencies for pension plans which could provide for (*a*) adequate income throughout the pensioners' periods of retirement and (*b*) mobility of members of the academic community, both within Canada and between Canada and other parts of the university world with which it has relationships; and
3. To make appropriate recommendations on these matters.

Particular effort was made to provide a report that would be valuable for a considerable period of time and to avoid out-of-dateness upon publication. It therefore begins with a discussion of the purposes of a retirement system, moves forward to discuss the desirable qualities of a system for the faculty of Canadian universities, and develops two model plans which could be adopted or, more likely, adapted to the use of Canadian universities. It touches on the practical problems of actuarial reviews of current plans, management of retirement plans, and revision of plans. Five very interesting pages are devoted to a discussion of conflicts of interests and differences of opinion as related to the public, officialdom, governing boards, university administrators, the faculty, and experts.

The author creates seven criteria to define the characteristics of a good retirement plan. He notes that "these criteria are nearly incompatible, and the construction of a retirement system is an exercise in the art of compromise." One of the unique values of this study is the application of these "yardsticks" to the particular situation in which mobility of the labor force among employers is presumed by the author to be a desirable characteristic as viewed from the vantage point of both employers and employees. The seven criteria are set forth as follows:

1. The system should provide for the retirement of people in such a way that there is not too great a loss of effective personnel or too great a retention of those whose usefulness has been undermined by age.
2. The system should make adequate financial provisions for those who retire. This implies not only adequacy at the time of retirement but methods to keep up with increased costs of living after retirement and, if possible, with increased standards of living. Adequacy also implies optional types of annuities, available upon retirement, to care for varying responsibilities.
3. The system should be neutral as to whether or not a man moves from a given institution; that is, it should not hinder mobility within the academic world or between it and other occupations.
4. The cost of the retirement provisions should be shared by the various institutions a man has served during his academic career.
5. The cost of the system should not be excessive.
6. There should not be too much administrative discretion involved in the operation of the plan.
7. The structure of the system should be simple enough to be understood by a faculty member (or a board member) who is willing to give it his attention.

Items 2, 3, and 4 provide the greatest difficulty in a climate of labor mobility. The study analyzes in considerable depth the impact on ultimate pension levels of the accumulation of short periods of coverage under different pension plans. The analysis considers three basic types of plans—a money purchase plan, a career earnings plan, and a final average salary plan. The author considers what happens when a man moves from one Canadian university to another Canadian university under assumptions that the first university has a retirement system of any one of three types and the second has either the same type or either of the other two types. These considerations deal with the effect not only on the benefit structure but on the incidence of the cost of providing the benefits.

The study discusses the advantages and disadvantages of the three basic types of plans, paying particular attention to the possibility of combining the variable annuity concept with the money purchase plan in both the preretirement and the postretirement periods. This in turn leads to a discussion of the TIAA-CREF money purchase plan available to colleges and universities in the United States. The author observes that "there would be very great advantages either in persuading the TIAA-CREF to operate under special agreements for Canada or in creating a Canadian counterpart."

The actuary's postscript summarizes very nicely the extensive analysis of money purchase vs. final average salary plans. In Mr. Eckler's words:

> A pure final average salary plan will not produce the full final average salary pension for faculty members who move from one university to another throughout their career unless there is a single final average salary pension plan for all the universities by which such faculty members were employed or unless a central reinsurance agency is instituted

which would provide the supplements required to bring their pensions up to the full final average salary amount. Such a central reinsurance agency would have to be financed by contributions from the various universities in the country. A single final average salary pension plan was rejected for the reasons given above and a central reinsurance agency was discussed by Dr. Ingraham and me, but we both discarded it because the administrative cost and complexities of such an agency would not be warranted, and in any event it would not be effective without further complications for faculty members moving in and out of Canada.

On the other hand, a pure money purchase plan with assets invested only in fixed income securities would certainly result in totally inadequate pensions if the present rate of general salary increases is assumed to continue in the future. A money purchase system will only result in adequate pensions under such conditions if a substantial portion of it is invested in equities and if the high degree of correlation that has existed in the past between equity prices and changes in general salaries continues in the future. In any event, there is no question but that a money purchase type of plan is the best instrument for eliminating the pension system as an impediment to mobility of faculty members between one university and another.

The purpose of the two models set forth in the study "is to describe two plans that illustrate good structure for a retirement system, not to present a choice between two straitjackets. . . . Both Models I and II are an effective mix of money purchase and final average salary ingredients which should produce reasonable mobility between one pension system and another and reasonable adequacy of the amount of pension being paid after retirement. Model I puts somewhat greater emphasis on mobility than on adequacy and Model II provides a higher guarantee than Model I but may produce smaller amounts than Model I for faculty members who move from one pension system to another."

J. DARRISON SILLESKY

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."

The review section of the *Journal of the Institute of Actuaries* contains digests in English of articles appearing in foreign actuarial journals.

ACTUARIAL AND OTHER MATHEMATICS, STATISTICS, GRADUATION

Society of Actuaries. The Committee on Research has prepared a series of bibliographies on particular topics within its specialized spheres of interest. Members of the Society are invited to request copies of the bibliographies for the following subjects:

Bayesian Statistics	Simulation
Multivariate Analysis	Systems Analysis
Operations Research	Theories of Mortality
Risk Theory	

Life Insurance and Annuities

U.S. National Center for Health Statistics, *Infant, Fetal, and Maternal Mortality, United States, 1963*, pp. 64, Public Health Service Publication No. 1,000, Series 20, No. 3, Washington, September, 1966.[1]

Data are presented by cause of death, geographic area, color, age and sex for infant, fetal and maternal mortality. Trend, gestation period, legitimacy, plurality, and birth order are also discussed.

Health Insurance

U. S. National Center for Health Statistics, *Proportion of Surgical Bill Paid by Insurance, Surgical Patients Discharged from Short-Stay Hospitals, United States, July 1963—June 1964*, pp. 40, Public Health Service Publication No. 1,000, Series 10, No. 31, Washington, September, 1966.

"Insurance covered all or part of the surgical fees in two-thirds of the estimated 13.6 million operations performed on 12.8 million Americans discharged from short-stay hospitals. In about 40 percent of the cases at least three-fourths of the surgeons' fees were covered by insurance."

U.S. National Center for Health Statistics, *Cost and Acquisition of Prescribed and Nonprescribed Medicines, United States, July 1964–June 1965*, pp. 59, Public Health Service Publication No. 1,000, Series 10, No. 33, Washington, October, 1966.

"An estimated annual average of $21.00 per person was spent for prescribed and nonprescribed medicines: about $15.00 for prescribed . . . and about $5.60 for non-prescribed medicines. . . . The annual cost of prescribed medicines rose steeply, from a low of $6.40 per person for those under 15 years of age to $41.40 per person for those 65 years and older." Additional data are presented by age, sex, color, family income, education of head of family, residence, geographic region, family size, and chronic activity-limitation status.

U.S. National Center for Health Statistics, *Rheumatoid Arthritis in Adults, United States, 1960–1962*, pp. 43, Public Health Service Publication No. 1,000, Series 11, No. 17, Washington, September, 1966.

This report examines the prevalence of rheumatoid arthritis by age, race, sex, family income, education, family size, place description, marital status, usual activity, occupation, and industry. About 3.2 per cent of the country's adults suffer from rheumatoid arthritis. It is rare among young adults but affects 23.5 per cent of the females and 14.1 per cent of the males in the 75–79 age group. There is little difference in prevalence by race, and persons with more education and those in the professions and in technical and managerial fields have lower than expected prevalence.

U.S. National Center for Health Statistics, *Prevalence of Osteoarthritis in Adults by Age, Sex, Race, and Geographic Area, United States, 1960–1962*, pp. 27, Public Health Service Publication No. 1,000, Series 11, No. 15, Washington, June, 1966, and *Osteoarthritis in Adults by Selected Demographic Characteristics, United States, 1960–1962*, pp. 27, Public Health Service Publication No. 1,000, Series 11, No. 20, Washington, November, 1966.

These reports present prevalence estimates for osteoarthritis which are based upon findings from X-rays of hands and feet obtained in the Health Examination Survey.

[1] See *TSA*, XVIII, 10.

An estimated 37 out of every 100 persons have an osteoarthritic condition. The prevalence is low among young adults, but the rate increases with age until by age 75 some 85 per cent are affected. Craftsmen and men employed in the mining and construction industry had higher than expected prevalence. Women with family incomes of $7,000–$9,999 and men with incomes of $10,000 and over had lower than expected prevalence rates.

SOCIAL SECURITY

R. J. Myers and C. B. Baughman, *History of Cost Estimates for Hospital Insurance*, Actuarial Study No. 61, pp. 54, Social Security Administration, Washington, December, 1966.

This study presents the history of the cost estimates for various proposals to provide hospital benefits which were prepared by the Office of the Actuary of the Social Security Administration.

One section deals briefly with the estimates made for proposals in 1952–59. The main part of the study deals, in some detail, with the estimates for proposals for hospital and related benefits for people aged 65 and over, beginning with the first King-Anderson Bill, introduced in February, 1961, and culminating in the enactment of Public Law 89-97 in July, 1965, which established the present Hospital Insurance program. Since 1961, the cost estimates for these proposals have been primarily the responsibility of the Office of the Actuary, which also prepares the cost estimates for the Old-Age, Survivors, and Disability Insurance program.

One of the main problems in preparing cost estimates for the Hospital Insurance program has been that it was found necessary to consider rising earnings, although the cost estimates for the cash benefits program are most appropriately prepared on a level-earnings assumption. Also, because of the uncertainties as to hospital and medical practices and costs, long-range cost estimates for the HI program cover only twenty-five years into the future (as against seventy-five years for OASDI).

Besides describing the fundamental assumptions, methods, and results, this study contains tables showing past hospital utilization rates and hospital costs, as well as estimates of future income and outgo under the various proposals and under the enacted legislation. Summaries of the benefit and financing provisions of the various proposals, including the one which was finally adopted, are also included.

F. Bayo, *United States Population Projections for OASDHI Cost Estimates*, Actuarial Study No. 62, pp. 39, Social Security Administration, Washington, January, 1967.

This study presents a new set of projections of the United States population, which are to be used in the cost estimates of the OASDHI program. The previous population bases of the cost estimates are discussed briefly. The new methodology and assumptions are discussed in detail.

Estimates of the July 1, 1965, population (including adjustments for net census undercount) are used as starting points. Two different mortality and fertility projections are included. The survival ratios for five-year age groups are presented by sex.

The projected populations are shown by sex and five-year age groups for every fifth year up to the year 2000. Values are also shown for the years 2025 and 2050. A brief tabular comparison is made, for selected years, with the previous projections prepared by the Social Security Administration and by the Bureau of the Census.

R. J. Myers and F. Bayo, *Long-Range Cost Estimates for Old-Age, Survivors, and Disability Insurance System, 1966*, Actuarial Study No. 63, pp. 47, Social Security Administration, Washington, January, 1967.

This study presents a new set of long-range cost estimates, prepared as of December 31, 1966, for the Old-Age, Survivors, and Disability Insurance System. The basic assumptions involved in the estimates are discussed briefly. Full results are presented for the estimates under the level-earnings assumption. The effects of an increasing-earnings assumption are also discussed. Tabular comparisons are included, for selected years, of the actual costs experienced and of the earlier estimates.

The OASDI system as a whole is found to be overfinanced, on a level-cost basis, by 0.74 per cent of taxable payroll. However, the DI portion is found to be underfinanced by 0.15 per cent of taxable payroll.

R. J. Myers and F. Bayo, *Disability Incidence Rates under OASDI System for Disability Onsets Occurring in 1956–62*, Actuarial Note No. 36, pp. 7, Social Security Administration, Washington, January, 1967.

This note briefly analyzes the incidence experience for disabilities with onset in the period 1956–62. The data are based on actual awards made before 1965 and on projections of awards after 1964. Values of the number of disability awards and of the incidence rates are presented by sex and by five-year age groups for each of the calendar years in the period. According to the analysis, the incidence rates increased until 1960 but remained relatively level thereafter through 1963. Preliminary aggregate data for 1964 and later years seem to indicate that the incidence rates rose significantly then.

OTHER TOPICS

*E. J. Faulkner (ed.), *Man's Quest for Security: A Symposium*, pp. xiv, 198, University of Nebraska Press, Lincoln, 1966.

This volume contains a series of addresses delivered in November, 1965, at the University of Nebraska. The occasion was the seventy-fifth anniversary of Woodmen Accident and Life Company.

Men of scientific eminence gave, respectively, a philosopher's view, a sociologist's view, a psychiatrist's view, a political scientist's view, an insurer's view, an economist's view, and a military scientist's view. Each, except the last of these, was followed by brief comments by two other authorities in the same field.

The insurer's view was given by Henry S. Beers, F.S.A. Mr. Beers focused attention upon the impressive record of American life insurance in adapting itself to changes in security needs in a constantly changing environment. One of the commentaries, by Professor Curtis M. Elliott of the University of Nebraska, draws attention to examples which that speaker felt indicate a contrary situation—slowness or unwillingness of our business to take care of developing needs and changes.

U.S. National Center for Health Statistics, *Report of the United States Delegation to the International Conference for the Eighth Revision of the International Classification of Diseases, Geneva, Switzerland, July 6–12, 1965*, pp. 74, Public Health Service Publication No. 1,000, Series 4, No. 6, Washington, September, 1966.

"The revised classification represents an important advance over the previous revision of the International Classification of Diseases. The proposed section on mental disorders is more closely aligned with the views of American psychiatry. Greater recognition is given to dental conditions and to congenital anomalies that are of interest in genetic studies of the human population. The classification of nature of injury, especially adverse effects of drugs, has been updated to meet needs of hospitals. The revision proposed by the Conference goes a long way to meet increased demands in the United

States during the coming decade for a suitable disease classification for various purposes."

The report also discusses problems that arose with regard to the international form of the medical certificate of cause of death, suggested lists of selected diagnoses for special tabulation purposes, utilization of the classification for hospital records, multiple causes of death, and advances in automatic data processing.

U.S. National Center for Health Statistics, *Method and Response Characteristics: National Natality Survey, United States, 1963*, pp. 36, Public Health Service Publication No. 1,000, Series 22, No. 3, Washington, September, 1966.

"In this report the methods and procedures used in the 1963 National Natality Survey are described, and selected findings on response and completeness of the data are presented. The 1963 survey was designed primarily to provide national estimates of the amount and type of exposure to ionizing radiation experienced by women during pregnancy. Information was also obtained on selected socioeconomic characteristics of families in which births occurred."