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BOOK REVIEWS AND NOTICES*

*P. F. Hooker and L. H. Longley-Cook, *Life and Other Contingencies* (Volume II), pp. ix, 256, published for the Institute of Actuaries and the Faculty of Actuaries at the Cambridge University Press, 1957.

Life and Other Contingencies, published under the authority of the Institute of Actuaries and the Faculty of Actuaries, is designed to meet the needs of students preparing for the examinations of those organizations. Volume I (containing Chapters 1 to 18)[1] dealt with single decrement tables and with functions involving only a single life. Volume II (containing Chapters 19 to 31) deals with the multiple-decrement table, with joint-life and contingent functions and with the technical processes connected with the valuation of pension funds, widows' and orphans' funds and disability benefits. Like its predecessor, this volume is carefully and attractively printed. It has a good index and each chapter includes some examples whose solution is presented concisely and often elegantly.

The treatment of the multiple-decrement table and its related single-decrement tables, in Chapters 19 and 20, is thorough and illuminating. To some extent, however, the detailed distinction between "selective" and "nonselective" decrements may present more of a hurdle than a help to students. Exception may also be taken to the authors' statement, on page 31, that in practice the "only" convenient way of constructing a multiple-decrement table from its related single-decrement tables is to multiply the radix of the former by the various probabilities of decrement at the youngest age, thereby determining the number of decrements by each mode, and then proceeding to the higher ages in the same manner. An equally convenient way is to determine the "living" column of the multiple-decrement table by multiplying the corresponding columns of the related tables, and then to compute the total decrement at each age; this total is then distributed in proportion to the central rates of the related tables.

An analysis of the alternative procedure just suggested leads to some illuminating ideas:

1. When the complete "living" column of the multiple-decrement table is constructed by multiplying the corresponding columns of the related single-decrement tables, the process is exact. The process is, in fact, the most convenient way of applying formula (20.8) and it avoids the labor involved in using formula (20.9).

2. The method preferred by the authors may lead to an accumulation of error, as would clearly be the case if the approximate formula (20.14) is used, because this formula is inconsistent with the exact formulas (20.9) and (19.24).

3. An accumulation of error is avoided when the approximate formula (20.11) is

* 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*.

[1] Reviewed in *TSA* VI, 219.

used, since this formula is consistent with (20.9) and (19.24). It is a remarkable fact that formula (20.11), which is derived by the authors on the assumption that ${}_tq_x = tq_x$ in each of the related tables, may be derived without greater difficulty on the more general assumption ${}_tq_x = f_t \cdot q_x$, where f_t is any monotonic increasing function such that $f_0 = 0$ and $f_1 = 1$. Students may find it helpful to note that formula (20.11) is of the form log $(1 + Z)$.

4. The alternative procedure also avoids an accumulation of error. It is exact on the unfamiliar but reasonable assumption that

$$\frac{\overset{\alpha}{\mu}_{x+t}}{\mu^{\beta}_{x+t}} = \frac{\overset{\alpha}{m}_x}{m^{\beta}_x} \quad \text{for} \quad 0 \le t < 1 \,.$$

This is readily seen from the first integral on page 32 of the text. Another way to justify the alternative procedure is by combining formulas (20.14) and (19.24). A third way is to combine formulas (20.13), (19.28) and (19.29).

The technique of allocating the total decrement in proportion to the various central rates is useful in a frequent practical problem. It is often desired to construct a multiple-decrement table using the absolute rate of death from a given table, the absolute rate of withdrawal from a second given table, and so on. The given tables may themselves be multiple-decrement tables and need not have the same modes of decrement or the same number of modes. Apart from the rough-and-ready method of assuming that the decrement probabilities of the given tables may be used with sufficient accuracy as the probabilities required for the new table, the most practical procedure is to compute the central rates for the desired modes of decrement, using the usual approximate formula. These central rates are then assumed to be equal to the central rates of the new table. The transfer of the central rates is equivalent to the transfer of the absolute rates, as measured by the usual approximations, and conversely. The following proof is worth recording, if only for its startling simplicity:

Let us consider two tables, whose functions are denoted respectively by primed and unprimed symbols; the number of modes of decrement are not necessarily equal; the tables have at least one mode of decrement in common. At any age x, we let

l = number living

d = number of decrements under a common mode of decrement

t = number of decrements under all other modes of decrement combined.

It is required to prove that if the two tables have the same central rate at age x for the common decrement, they also have the same absolute rate for that decrement, as measured by the usual approximations. In symbols, if

$$\frac{d}{l - \frac{1}{2}t - \frac{1}{2}d} = \frac{d'}{l' - \frac{1}{2}t' - \frac{1}{2}d'}$$

then

$$\frac{d}{l - \frac{1}{2}t} = \frac{d'}{l' - \frac{1}{2}t'} \,.$$

The proof is immediately evident. By the rules of proportion, we may add one-half of the numerators in the first proportion to the respective denominators, and the second proportion results. The converse is equally evident.

Chapter 21 provides an introduction to the joint-life mortality table, pointing out the resemblance to the multiple-decrement table. The latter half of the chapter deals with certain standard deviations and the effect of treating these at this point is to introduce a discontinuity in the presentation.

Joint-life and last survivor annuities and assurances are treated concisely in Chapter 22, which includes an elegant derivation of the well-known formulas for expressing various probabilities in the Z notation. The authors have chosen to solve Example 22.2, on page 68, by a rather unnatural process. They use the "at least" form of the Z function when the problem is more directly handled by use of the "exactly" form in which the problem is stated. Furthermore, they have used the Z formula without any prior proof of its validity in connection with deferred annuities involving various periods of deferment.

Chapter 23 presents some general theorems of life contingencies, together with approximations based on these theorems. This chapter, perhaps more than any other, epitomizes the meticulous approach the authors have taken throughout the book, and the material will be of special interest to most students. This makes it all the more regrettable, to this reviewer, that this chapter constitutes a discontinuity in the general treatment of multiple-life functions.

The succeeding four chapters, which complete the discussion of multiple-life functions, are clearly and concisely written. There is, however, some doubt in the reviewer's mind on the proper interpretation of Example 25.3. In the situation where (y) predeceases (x), it would appear that (u) and (v) are not entitled to any payments, although the solution assumes the reverse.

In developing the standard formulas for replacing a number of lives of unequal age by one or more lives of equal age, under tables following Gompertz's law, the authors make the usual implicit assumption that, if $\mu_w = \mu_x + \mu_y$, then $\bar{a}_w = \bar{a}_{xy}$ exactly. This would be valid if the table ran to an infinite age, but it is erroneous when the table terminates at a finite age. It is all too obvious (and therefore highly elusive) that, if z is the lowest age such that $l_z = 0$, the correct result is:

$$\bar{a}_w = \bar{a}_{xy:\overline{z-w}|}\,.$$

This reflects the fact that w exceeds both x and y, in a Gompertz table.

Similarly, in a Makeham table, where (w) and (w) replace (x) and (y), w is intermediate between x and y, being higher than the average of x and y. Assuming that $x < y$, we have

$$x < \frac{x+y}{2} < w < y$$

and

$$\bar{a}_{xy:\overline{z-y}|} = \bar{a}_{ww:\overline{z-y}|}$$

or

$$\bar{a}_{xy} = \bar{a}_{ww:\overline{z-y}|}\,.$$

Fortunately, the error involved is not of practical importance but it seems strange that the error is not noted in any textbook the reviewer has seen.

Chapters 28 and 29 provide an introduction to some of the technical aspects of pension funds, and may be helpful in illustrating the general principles involved. Undue emphasis on details seems to characterize the writing. For example, four successive formulas for valuing future contributions are derived. The formulas differ only in the assumed dates of salary revision, but almost five pages are devoted to them. The final result of this concentration on the trees is the conversion of the forest into a jungle of formulas. Students should note that formula (29.1) assumes that each employee is eligible immediately for ill-health retirement; in practice, many employees will not have met the age or service conditions for ill-health retirement and the age subscript in the numerator will require adjustment. Students should also be cautious of the statement on page 169 that the contributions from the employer to liquidate the past service liability "may be valued by an annuity-certain." This is true in only a small portion of the pension funds with which the reviewer is familiar.

The two final chapters provide a good insight into the basic techniques required in widows' and orphans' funds, and a broad, elementary treatment of disability benefits.

As was the case with Volume I, the present volume reflects the high mathematical talents of the authors and their painstaking precision. The two volumes represent a worth-while acquisition to any actuarial library.

HARRY GERSHENSON

*M. T. L. Bizley, *Probability, an Intermediate Text-Book*, pp. viii, 230, published for the Institute of Actuaries and the Faculty of Actuaries at the Cambridge University Press, 1957.

This volume is one of the series of textbooks designed to meet the needs of students preparing for the examinations of the Institute of Actuaries and the Faculty of Actuaries. It resembles treatments of the theory of probability recommended to actuarial students in the past to the extent that the emphasis is very definitely on the solution of "tricky" problems. Persons on both sides of the Atlantic confronted with probability problems of this type have often found that an actuary was the best person to turn to for help; and there is no doubt that among at least a section of the general public actuaries have established a reputation as expert solvers of difficult probability problems.

In the Course of Reading for our own examinations, probability is lumped with statistics, and the only recommended textual readings on probability are the chapters dealing with the subject in two statistics texts. However, our Education and Examination Committee has not yet burnt all its bridges with the past, as shown by the further inclusion of the problems in Chapter 10 of Freeman's *Mathematics for Actuarial Students*, Vol. II. In this reviewer's opinion, it can be seriously questioned whether the average student is adequately prepared to solve these problems by reading the chapters on probability in Wilks' *Elementary Statistical Analysis* and Mood's *Introduction to the Theory of Statistics*. Only the most elementary notions of probability are required for the study of mathematical statistics (and, it must be admitted, for the everyday work of most actuaries). However, until our Society finally discards from its examination requirements probability problems of the tricky variety, enterprising Part 3 candidates who wish to leave no stone unturned in their preparation could do worse than consult Bizley's book.

This work differs from texts on probability previously recommended to actuarial students in that the presentation is mathematically rigorous, or as nearly so as it could be made without appealing to the theory of sets. In fact, a near rigorous treatment employing only the conventional freshman and sophomore mathematics is a remarkable tour de force, but it has been achieved by the author at the cost of making the first chapter and a few sections of other chapters most difficult reading for any student not possessing an unusual degree of intellectual and mathematical maturity. While this first chapter is unquestionably wholesome reading for the actuary who wants to be fully aware of the unstated and often unconscious assumptions underlying his everyday application of the theory of probability, the reviewer suspects that few readers would ever get through it to the real meat of the book except in a "captive audience" like that of actuarial examination candidates.

Besides this chapter on "Fundamental Principles," the other six chapters are: "Rules of Combination of Probabilities," "The Theorems of Waring and Bayes," "Repeated Trials: Expectation," "Indirect Methods," "Runs," and "Continuous Variables." There is an appendix on "Well Known Definitions and Theories of Probability" which briefly describes the theories associated with the names of Venn, von Mises, Kerrich, Kolmogoroff, Steffensen, Jeffreys, Perks, and Good. A table of values of $\Delta^n 0^m/n^m$ (the probability that no box is empty when each of m objects is placed at random in one of n boxes) is included as a second appendix. Although, as previously stated, the emphasis is on the solution of tricky problems, these solutions are not presented on an *ad hoc* basis. Rather, the various types of problems are very neatly catalogued and classified, and general methods of solution for handling large classes of problems are systematically developed.

Certain features are worthy of special mention. Section 1.11 contains some careful statements concerning the definition of the probability of a particular event, which, if thoroughly digested, could help students to avoid several common pitfalls in solving problems. Section 1.13 contains a critical study of the ambiguities which unfortunately often creep into the statements of questions on probability, as well as practical suggestions for dealing with such ambiguous problems when one cannot ask for a restatement of the question (as on an examination). Chapter 2 contains a careful discussion of the meaning of "independence" for more than two events, with examples to show that three or more events may be all independent in pairs and yet not independent when taken together. Numerous problems are solved in the text, and the author is constantly pointing out simple ways in which the reasonableness of an answer can be checked. Many wrong answers would be quickly detected by these procedures, which will certainly be worth their weight in gold to examination candidates.

On page 163 the author speaks of "at least three successes" when he means "at least three consecutive successes," and three more similar omissions of the word "consecutive" occur later in the same paragraph. However, the context is such that an intelligent reader would probably understand what is meant. The final chapter on "Continuous Variables" incidentally provides a rigorous justification of the procedure followed in the theory of life contingencies in setting up integrals for various probabilities and for the present value of benefits (though this is not specifically mentioned in this text). In the reviewer's opinion, the book's usefulness would be increased if more references were given to other sources to which the reader might turn for a fuller treatment of certain topics.

T. N. E. GREVILLE

R. A. Fisher, *Statistical Methods and Scientific Inference*, pp. viii, 175, Hafner Publishing Company, New York, 1956.

It is little exaggeration to say that most of the statistical techniques used today in the experimental field—scientific or industrial—were developed by Fisher and his disciples or by writers stimulated by their fundamental disagreement with him. These facts underline the importance of Fisher's new book for those who are interested in the epistemological bases of statistical methods. But they indicate that this book must be read with caution and possible reservations. In fact, unless the reader is already familiar not only with the statistical theory contained in Fisher's two previous books, *Statistical Methods for Research Workers* and *The Design of Experiments*, but also with some of the reasoning on which divergent techniques are based, he is not likely to benefit by a study of the new work.

The book consists of six chapters and an index. The first two chapters quickly show that the author has a very individual viewpoint and an aggressive way of presenting it. Thus, for example, the references to Karl Pearson's "pretentious and erratic" contributions to biometry and the nomination of Bayes, Boole and Venn as the writers responsible for the pre-Fisherian attempts to develop a procedure of scientific inference must be taken with a liberal pinch of salt.

After these two "historical" chapters Fisher proceeds, in Chapters IV and V, to explain his concept of the place of "tests of significance" and of "fiducial argument" in the general procedure of quantitative inference. In the next, and final, chapter there is a restatement of the Fisherian theory of point estimation which supplements the simpler treatments given in the last chapter of each of his earlier books and in his Calcutta University lectures of 1938.

In conclusion, then, we may say that this is an important and provocative book on the foundations of scientific inference. That the views here expounded have both adherents and critics may be observed by reading the excellent "technical" reviews in, *e.g.*, *Biometrika*, XLIV, 293 (Bartlett), *Jour. Roy. Statist. Soc.* A, CXX, 88 (Bailey), and *J.I.A.*, LXXXIII, 64 (Johnson).

HILARY L. SEAL

The Registrar General's Decennial Supplement, England and Wales, 1951, *Life Tables*, pp. 37, H.M. Stationery Office, London, 1957.

The series of numbered official life tables for England and Wales based upon national census and death records had their start with those computed by Dr. William Farr using data for 1841. Later life tables bear the authorship of other distinguished statisticians and actuaries—Dr. William Ogle, Dr. John Tatham, George King, and Sir Alfred Watson. The methods of constructing these life tables are conveniently summarized by Elston and Wolfenden.[1]

To this series is now added English Life Table No. 11 prepared by Sir George Maddex, Government Actuary, the occasion being the census of 1951. Various considerations led to the use of deaths for the three year period 1950 to 1952, thus conforming to the practice followed with the Life Tables based upon the censuses of 1911, 1921, and 1931. No census was taken in 1941. The considerations included the effect of an influenza epidemic of 1951 upon mortality and also the use of a five year period for deaths.

The census date, April 8, 1951, is not far from the midpoint, June 30, of the three year period of deaths, 1950 to 1952. It was found, upon examination, that use of the census data would have no appreciable effect upon mortality at ages under 45. However, at the higher ages, an adjustment of the population base to the midpoint seemed warranted. Central death rates were computed for each age; these showed irregularities due, principally, to errors in statement of age and to random fluctuations.

For the graduated table, mortality rates at ages 0 to 5 were computed from recorded births and deaths as for the life tables for 1930–32.[2] For ages 6 to 20 for men and 6 to 26 for women, where mortality is very low, the central death rates were smoothed by forming averages for three successive ages and placing the average at the mid-age. At ages 21 and over for men and 27 and over for women, graduation was performed by the same mathematical formula for the two sexes, in place of the widely used method developed by King. A study of the progression of the central death rates led to a combination of a logistic curve with a symmetrical normal curve, namely

$$m_x = a + \frac{b}{1 + e^{-\alpha(x-x_1)}} + c\, e^{-\beta(x-x_2)^2} .$$

The graduated mortality rates were found to conform very closely to those obtained by the method of King, thereby establishing comparability with previous national life tables. The accompanying table compares some results of English Life Table No. 11 with recent national life tables of other English-speaking countries.

[1] J. S. Elston, *Sources and Characteristics of the Principal Mortality Tables*, second edition, The Actuarial Society of America, 1932, pp. 11–32, and H. H. Wolfenden, *Population Statistics and Their Compilation*, revised edition, Society of Actuaries and University of Chicago Press, 1955, pp. 118–122, 130–133.

[2] See H. H. Wolfenden, *op. cit.*, p. 121, and M. Spiegelman, *Introduction to Demography*, Society of Actuaries, Chicago, 1955, p. 80.

Mortality Rate and Complete Expectation of Life
Recent Official Tables for the United States and English-Speaking Countries of the British Commonwealth of Nations

Sex, Country, and Period	1,000 q_x					$\mathring{e}_x$				
	0	20	40	60	80	0	20	40	60	80
Male:										
United States, 1949–51*	30.69	1.62	3.91	23.81	109.93	66.31	49.52	31.17	15.76	5.88
Canada, 1950–52	43.25	1.72	3.28	20.71	108.46	66.33	50.76	32.45	16.49	5.84
England and Wales, 1950–52	32.66	1.29	2.90	23.69	136.29	66.42	49.64	30.98	14.79	4.86
Scotland, 1950–52	41.36	1.41	3.45	26.98	146.85	64.4	48.3	29.9	14.3	4.6
New Zealand, 1950–52†	24.99	1.61	2.68	19.51	112.60	68.29	51.15	32.65	16.19	5.55
Australia, 1946–48†	31.99	1.69	3.37	22.78	120.11	66.07	49.64	31.23	15.36	5.36
Union of South Africa, 1945–47†	41.28	2.02	4.56	25.41	114.30	63.77	48.35	30.38	15.34	5.51
Female:										
United States, 1949–51*	23.55	.73	2.42	13.40	90.60	72.03	54.56	35.64	18.64	6.59
Canada, 1950–52	34.23	.91	2.57	13.08	92.22	70.83	54.41	35.63	18.64	6.38
England and Wales, 1950–52	25.10	.83	2.27	12.71	104.66	71.54	54.17	35.32	18.07	5.83
Scotland, 1950–52	32.26	1.34	2.97	15.64	118.61	68.7	51.9	33.6	16.8	5.4
New Zealand, 1950–52†	19.95	.68	2.09	13.16	93.34	72.43	54.64	35.64	18.53	6.16
Australia, 1946–48†	25.19	.91	2.84	13.60	100.27	70.63	53.47	34.91	18.11	6.02
Union of South Africa, 1945–47†	32.91	1.25	3.73	15.68	90.28	68.31	52.27	34.07	18.04	6.43

* White population only. † European population only.

The report is particularly interesting for its critique of King's method of life table construction. It points out, in the first place, that this method depends upon estimates of population and deaths at pivotal ages in order to reduce the effect of misstatements of age, and, secondly, that the mortality rates at the pivotal ages are not themselves graduated. Since no five year groupings of population and deaths have been found which will completely eliminate the effects of misstatements of age, it follows that the pivotal values computed from them are still under their influence to some extent. Consequently, the resulting mortality rates at the pivotal ages may retain some features that it would be desirable to minimize. The formula used produces a powerful graduation and, at the same time, conforms as closely to observations as does an application of King's method. A further advantage of the use of a formula which operates on central death rates for successive ages is that the year-to-year fluctuations in births out of which the population and deaths arise need not be taken into account since both are affected in like degree.

The report also presents mortality rates for 1950–52 according to marital conditions and for geographic areas. At the younger ages, the mortality of single women is considerably in excess of that for the married, but the margin diminishes with advance in age, so that the two categories have practically identical rates at ages 62 and over. However, the younger single women were at considerably greater disadvantage in 1950–52 than in 1930–32. This is attributed to the high marriage rates since 1939 which, as a result of the selection of healthier lives for marriage, left larger proportions of unhealthy lives among those remaining single. The geographic comparisons show that mortality in Greater London is below the national average.

MORTIMER SPIEGELMAN

D. W. Gregg, *Group Life Insurance: An Analysis of Concepts, Contracts, Cost and Company Practices*, pp. xviii, 262, Richard D. Irwin, Inc., Homewood, Illinois, 1957.

This is a revision of a volume originally published in 1949 in a series of the Huebner Foundation publications. In order to adapt it to classroom use the new book has been extensively reorganized. Some material of early historical value only or of a controversial nature has been deleted. Other matters which were discussed as isolated issues have now been integrated into the basic organizational structure of the book. All of the material has been brought up to date and new developments in the group life field have been included.

The revised edition first traces the nature and development of group life insurance, pointing out the advantages of an insured group plan. Then the basic features of group life insurance with respect to coverage, benefits and financing are explained. Some of the current problems of group insurance are covered in this chapter, such as continuation of coverage on retired or older age employees, maximum amount of insurance on any one life, and the extension of the group principle to areas beyond those currently covered.

After a thorough analysis of the provisions of the master contract and the employee's certificate, the book discusses developments on group paid-up, level premium group permanent, group creditors insurance and dependent group life insurance. A special section is devoted to the Federal Employees Group Life Insurance Plan. Subsequent chapters are concerned with the problems involved in marketing and administration, selection and reinsurance and the calculation of premiums, dividends and reserves. Valuable appendixes are included showing legal definitions and standard provisions of group life insurance, a specimen master policy, a specimen employee certificate and specimen applications.

The revised edition is an authoritative, up-to-date exposition of group life insurance and should serve as an effective educational tool for those interested in this most dynamic field of insurance.

HAROLD F. HARRIGAN

Suggestions for Research in the Economics of Pensions, pp. xii, 51, National Bureau of Economic Research, Inc., New York, 1957.

National Superannuation, pp. 123, published by the Labour Party, London, 1957.

Retirement Pensions, pp. 16, issued by the Life Offices' Association, London, and the Associated Scottish Life Offices, Edinburgh, March 1957.

The Pensions Problem, pp. 15, issued by the Life Offices' Association, London, and the Associated Scottish Life Offices, Edinburgh, September, 1957.

Is there any objective way to pin down the approximate point at which social security begins to go beyond its range of possible usefulness and demonstrably begins to damage the American economy, and hence the American people and the American way of life?

. . . there have been a great many studies of social security and related programs in the past two decades, both governmental and private. But these studies have mainly focused on the question of how best to recast the technical provisions of the Social Security Act in order that it may most effectively serve its social and humanitarian purposes.

So far, no broad study in the United States has approached social security with the aim of measuring its long-range consequences on the American economy.

The foregoing statements were made by Ray D. Murphy in his presidential address to The Life Insurance Association of America on December 14, 1955. On that occasion, he announced arrangements made by a Policy Committee of the Association, comprised of Edmund Fitzgerald, Louis Dawson and Ray D. Murphy, with the National Bureau of Economic Research, Inc. for an exploratory survey of the economics of pensions. The product is *Suggestions for Research in the Economics of Pensions*, with a sub-title *Report of an Exploratory Survey of the Economic Aspects of Organized Provision for the Aged and Surviving Dependents*. Timely, in this connection, are the documents on *National Superannuation* published by the Labour Party in Great Britain and *Retirement Pensions* and *The Pensions Problem* by the Life Offices' Association of London and the Associated Scottish Life Offices.

In this review I shall examine social security principles currently propounded, present a brief description of the reports under review, and, finally, focus attention on certain critical questions to which the suggested research could bring much needed enlightenment. This approach brings into the picture other current publications and public statements.

Basic Social Security Principles in the United States

Mr. Murphy's observation may be illuminated by quoting recent statements, from different sources in the United States, of the philosophy or basic principles and concepts of social security. Note particularly the absence of any broad economic considerations except that of the economic benefit arising from the great purchasing power possessed by social security beneficiaries.

Marion B. Folsom, Secretary of Health, Education and Welfare, recently[1] stated that our social security system is based on certain sound and fundamental principles:

> One of the foremost of these basic principles is that benefits are earned through work—and the right to benefits is paid for by contributions from the worker's own earnings and from his employer, as fixed by law. Whether an individual or his family gets a benefit and how much they get are related to the individual's own contribution to production. . . .
>
> Another fundamental principle is that social security payments are intended to provide a base of protection upon which workers and employers may build additional security through private effort and individual thrift. . . . A compulsory social security system should not be expected to meet every need for economic security in every circumstance. Such an all-embracing concept, I believe, would impose a future social security tax burden so great that popular support for the system would be endangered.
>
> A third important principle is that the social security should be flexible—it should keep abreast of the times and reflect increasing experience and knowledge in this field. . . .
>
> The social security system also plays an important part in maintaining general economic growth and stability. . . . The benefits—some $7 billion this year—quickly enter the stream of commerce and help sustain business and industry against sudden troughs and downturns.

Professor J. Douglas Brown of Princeton University gave his idea of the American philosophy of social insurance in a lecture[2] originally presented in November, 1955:

> The first and foremost element in our philosophy of social insurance . . . is that the system must provide protection as a matter of right and not as a benevolence of a government, an institution, or an employer. . . .
>
> A second element . . . is that all citizens should be eligible to coverage under a sys-

[1] "Advances in Social Security," Address at Dedication of New District Office, Bureau of Old-Age and Survivors Insurance, 1657 Broadway, New York, N.Y., June 6, 1957.

[2] Sidney Hillman Memorial Lecture, University of Wisconsin, 19 November 1955. Reproduced in the March-April 1957 *Bulletin of the International Social Security Association*.

tem regardless of class or level of income, and that, in principle, exceptions to coverage were to be made only for constitutional or administrative reasons. . . .

A third element in our philosophy [is that] the individual worker establishes, within limits, the level of his protection by his individual contribution to our economy. . . .

A fourth element of our philosophy of social insurance is in the process of evolution. Its desirability is still debatable in certain areas of protection. This is the concept of protection of the family unit as such by social insurance against all the hazards which that unit might face. . . .

I have left until last an element in the American philosophy of social insurance which I hope will grow from strength to strength despite severe limitations put upon it by what are to me shortsighted theoretical and political considerations. This is the concept of joint contributions by employer and employee. . . .

Professor Brown finally states that an important feature of our social insurance system

which arises out of our pragmatic political philosophy, as opposed to any distinct philosophy of social insurance, is the lack of definition in respect to reserve policies, state or federal. Early in the development of our old-age insurance system, the size of the reserve to be accumulated was a burning question. To avoid a large reserve, the scale of contributions was held down. The question of eventual governmental contributions to the system to compensate for these low rates during the early years of the system has been shelved for our children and grandchildren to answer. . . . The early issue between "pay-as-you-go" and "large reserves" seems to have faded into the background. In old-age and survivors insurance, we have let the actuaries worry about the problem of balancing income and outgo over time. Perhaps this is a mark of financial sophistication. We trust specialists in most aspects of life, why not in the planning of the financial aspects of social insurance? In any case, the essential security of the national system rests upon the taxing power of the United States Government and the willingness of the people to have it exercised.

Are the actuaries fully aware of the responsibility Professor Brown believes they are carrying?

The absence of a definite financing philosophy suggested by Professor Brown may appear to many persons to be confirmed by the vagueness of the statutory funding principles. Section 201(c) of the Social Security Act provides:

It shall be the duty of the Board of Trustees to—

(1) Hold the Trust Funds;
(2) Report to the Congress not later than the first day of March of each year on the operation and status of the Trust Funds during the preceding fiscal year and on their expected operation and status during the next ensuing five fiscal years;
(3) Report immediately to the Congress whenever the Board of Trustees is of the opinion that during the ensuing five fiscal years either of the Trust Funds will exceed three times the highest annual expenditures from such Trust Fund anticipated during that five-fiscal-year period, and whenever the Board of Trustees is of the opinion that the amount of either of the Trust Funds is unduly small. . . .

The report provided for in paragraph (2) above shall include a statement of the assets of, and the disbursements made from, the Trust Funds during the preceding fiscal year, an estimate of the expected future income to, and disbursements to be made from, the Trust Funds during each of the next ensuing five fiscal years, and a statement of the actuarial status of the Trust Funds.

There is Congressional concern about the Funds becoming *more than* three times the highest annual rate of expected expenditure during any of the next five years, concern about the Funds becoming "unduly small" according to some unknown criterion, and finally a Congressional interest in what is called the "actuarial status" of the Funds. The actuarial status of the Funds has been given in reports to Congress by comparing the level percentage of payroll required to support the benefits in perpetuity with the level percentage equivalent of the graded contribution schedule in the statute. If these are approximately equal, a satisfactory actuarial balance is considered to exist. There is, of course, an infinite number of contribution schedules that would meet this standard of actuarial balance, including a schedule designed to cover only required disbursements on a current pay-as-you-go basis with no Trust Funds!

There is one other Section of the Social Security Act which deals with financing policy. Sec. 116 of the amendments of 1956 provides for an Advisory Council on Social Security Financing. Such a Council is a temporary one, the first one being required to report not later than January 1, 1959 and subsequent ones to be appointed "not earlier than three years and not later than two years prior to January 1 of the first year for which each ensuing scheduled increase (after 1960)" occurs in the taxes representing Social Security contributions. The duties of this Council are given in paragraphs (a) and (d) of Sec. 116:

(a) There is hereby established an Advisory Council on Social Security Financing for the purpose of reviewing the status of the Federal Old-Age and Survivors Insurance Trust Fund and of the Federal Disability Insurance Trust Fund in relation to the long-term commitments of the old-age, survivors, and disability insurance program.

. . . .

(d) The Council shall make a report of its findings and recommendations (including recommendations for changes in the tax rates in sections 1401, 3101, and 3111 of the Internal Revenue Code of 1954) to the Secretary of the Board of Trustees . . . such report to be submitted not later than January 1, 1959. . . .

The instructions to this Council are general and indicate Congressional concern about the long-term relationship of contribution rates, amount of trust funds and the commitments of the Social Security Act. Congress appears to be seeking the comfort and assurance of a theoretical long-term actuarial balance and no more than that. There is no evidence of Congressional concern with respect to the impact on the general economy of the system of social security financing.[3]

[3] The initial Advisory Council appointed by Secretary Folsom in October, 1957, includes two members of the Society of Actuaries, Reinhard A. Hohaus (representing employers) and Carl H. Fischer (representing public and self-employed). This latter group also includes Professor J. Douglas Brown of Princeton; Arthur F. Burns, president of the National Bureau of Economic Research; and Robert McAllister Lloyd, chairman of the Teachers Insurance and Annuity Association of America.

Finally, Sec. 702 sets forth the duties of the Secretary of Health, Education, and Welfare:

> The Secretary . . . shall perform the duties imposed upon him by this Act and shall also have the duty of studying and making recommendations as to the most effective methods of providing economic security through social insurance, and as to legislation and matters of administrative policy concerning old-age pensions, unemployment compensation, accident compensation, and related subjects.

Note that the main emphasis is upon benefits.

One interpretation of social security concepts of the United States is given in a paper by Herman M. Somers and Anne R. Somers appearing in the March–April 1957 *Bulletin of the International Social Security Association*. One may sense that these social insurance experts are of the school that favors "big" social security. They state with great confidence that the following are the social security concepts that now prevail in the United States:

> I. *Social security, with social insurance as its keystone, has become accepted as an established part of American institutional life. Nineteenth-century views alleging a basic conflict between security and freedom have declined rapidly as evidence of the contrary truth unfolds.* . . . The American business-minded community is now finding justification for social security not only in its traditional function of providing for individual and family welfare but also because it serves certain broad economic functions simultaneously: for example, the maintenance of adequate levels of purchasing power is now sought not only for contra-cyclical purposes but also to insure, in normal times, the confidence of buyer and seller in the practicability of instalment buying by wage-earners through assured continuity of income.

The only economic consideration here is the maintenance of purchasing power including the encouragement of instalment buying—an entirely new thought to this reviewer which borders on the ridiculous as related to old-age benefits, although it may have some significance with respect to unemployment benefits.

> II. *While the American system emphasizes social insurance, it is accepted that comprehensive social security includes public assistance and welfare services.*
>
> III. *Our programs have developed along a pluralistic pattern characteristic of other American institutions. However, it is fully recognised that social security is primarily a governmental responsibility* . . . the basis of American social security remains public and . . . private employee benefit plans, important as they are, remain supplementary and secondary. . . . The public programmes have been the major stimulus of private programmes.
>
> IV. *There has been a slow but steady expansion in the risks covered by social insurance as well as an increase in persons covered.*
>
> V. *There is increasingly widespread activity, lively experimentation and public debate in the area of medical care insurance. Rapid changes are taking place in both the organisation and financing of medical care but the eventual pattern is still uncertain.*
>
> VI. *Benefits have become increasingly directed towards the family unit rather than the individual insured.*
>
> VII. *There has been a significant and constructive movement in the direction of adding service benefits to cash income maintenance.*

VIII. *The social insurance principle of differential benefits has faced a sharp challenge as a result of the rapid rise of real wages. From this experience there appears to be emerging a reaffirmation of the concept of high benefit levels as a needed support for a dynamic economy as well as for individual and family welfare.*

There is a discussion of a so-called "new conception of the role of social security," *i.e.*, high benefits in order to provide an even larger level of stable purchasing power. The discussion concludes:

> Opportunities for generous benefits and liberal interpretation of objectives will continue as long as costs appear easily manageable. An expanding economy will ensure that costs remain proportionately moderate, even as the programmes grow. In turn, the view is taking hold that social security can help to make the economy, which sustains it, dynamic and expanding.

Although the authors purport to be concerned with matters of broad economic character, there is no recognition of economic considerations other than the one referred to above.

"Suggestions for Research in the Economics of Pensions"

This report by the National Bureau of Economic Research stresses that research should examine the nation's pension structure as a whole. It includes OASDI, OAA, railroad retirement, veterans' pensions, pensions for all governmental employees and private pensions. Retirement provisions made by individuals and profit-sharing plans are not included.

The outline of contents of the report indicates its scope:

I. Present and Future Scope and Characteristics of Pension Plans
   A. The Present
      Public programs
      Private plans
      1. The scope, characteristics, and financial operations of private pension plans
      2. Historical analysis of the growth of private pensions and the factors affecting their growth
      3. Turnover and future benefit payments
   B. The Future
II. Impact of Present and Future Pension Plans on Savings and Investment
   A. Pensions and Saving
      1. The net effect of pension program transfer operations on the level of saving
      2. Pension coverage and peoples' spending and saving response thereto
      3. Analysis of pension fund accumulations in the context of statistical explanations of the proportion of income saved
   B. Pensions and Investment
III. Relation of Present and Future Pensions to the Level and Distribution of National Income and Product
   A. Effect of Pensions on Labor Mobility
      1. A study of the effect of pensions on mobility based on matched samples of firms
      2. Two other studies

B. Redistributive Effects of Pensions
   1. Income class redistributions through pension contributions and benefits: current and future
   2. Redistribution of purchasing power from the working population to the retired aged

IV. Pensions and Stability

V. The Tax Treatment of Pensions and the Aged

Several major ideas are developed and discussed.

1. There is the view that

> Basic to any investigation of the economic impact of our present pattern of pension programs . . . is the development and analysis of two bodies of data—the present scope and characteristics of pensions and the probable size of the pension structure at some dates in the future, say over the next thirty years.

2. In putting emphasis upon the nation's pension structure as a whole (something that has not been done adequately before, to this reviewer's knowledge) it is easier to assess the implications of specific features of or changes in any particular program.

3. The report urges the examination of economic effects both in terms of level of employment and in terms of the efficiency with which resources are utilized. There is emphasis on the relation between pension program fiscal operations and economic growth.

4. The report observes that in some areas

> the effect of pensions would, ideally, best be examined within the context of broader studies, [for example,] areas of savings, labor efficiency and mobility, and capital markets.

5. In suggesting research, the report aims to provide suggestions for interested students—not a research agenda for any particular research groups. Also, it is noted that while some research must wait on the collection of new data, much can be done with materials already available.

Critical Crossroads in Retirement Programs

The report by the National Bureau of Economic Research should be studied by every actuary and should reach the eyes and minds of many people from all walks of life. The careful student of the report will realize that we are now at a crossroads as to retirement provisions—which road is the wise one to take? Large social security benefits with private plans taking a minor role? Social security as only a basic layer of protection with private arrangements having and encouraged to take a major role? What should be the role of public old age assistance and veterans' pensions?

There is a dangerously cynical and apathetic view widely prevalent that social security benefits will be liberalized every two years associated with the Congressional elections. One may sense that the federal social security system has wide acceptance and popularity, that there has been a willingness to pay the taxes at the *present level* and that there is considerable sentiment for increased benefits.

As we face this crossroads, we must realize that unduly liberal social security legislation enacted now cannot be readily deliberalized if that seems called for at some distant time in the future when the full impact of the legislation comes into play. A mistake made now can be a very costly one indeed. On the other hand, overreliance on private programs, should that occur, can be readily corrected. We need only look at the several adjustments made by private plans to the advent and to increases of social security benefits.

The proper role of nationwide, compulsory governmental pension programs is a very active political issue in Great Britain and Sweden at the present time. A study of the debate taking place in each of these countries will help us better appreciate some of the fundamental considerations with respect to which we need more knowledge—knowledge that could well be secured by the lines of research suggested by the report of the National Bureau of Economic Research —knowledge which we need before we decide which direction we take as we stand at this critical crossroads.

"National Superannuation"

In Great Britain, the National Executive Committee of the Labour Party presented the outline and principles of a new liberalized nationwide compulsory pension program in *National Superannuation.* The inadequacy of benefits of the present system is first criticized. As a percentage of average industrial earnings in October 1956, the old-age pension is 16.8% for a single man and 27.3% for a man and wife. (The United States Social Security formula applied to recent average industrial earnings of about $80 weekly produces percentages of 31.1% for a single man and 46.6% for man and wife.) Present private pension plans are criticized because they cover only a minority of workers and, in the majority of such plans, pension rights are not transferable.

Then a new National Superannuation program is outlined having these features:

a) All persons would be included compulsorily except those who are members of an approved superannuation scheme with which they desire to remain.
b) The National Superannuation scheme would be supported by contributions of employees, employer and the Exchequer.
c) Contributions would be a percentage of earnings and the pension when the scheme is in full operation, say 30 years hence, would be about half pay at retirement for the worker whose earnings are close to the national average.
d) One of the conditions for the continuance of a private pension plan would be that it should permit transferability of pension rights.
e) Pensions are scaled up to reflect increases in national earnings and are adjusted after retirement in accordance with a cost of living index for pensioners.
f) The scheme contemplates advance funding (except for a basic minimum).

The following excerpts from the statement of principles are noteworthy.

National Superannuation would provide a system of "National savings," which should help the country to carry through the large-scale capital investment so essential if we are to continue to expand our exports and improve our living standard.

After recognizing the possibility of actual deficit in funds at some future time, this statement is made:

> It would be unwise, however, to give too much importance to hypotheses about what may happen in the 1980's when we are making up our minds about the merits of National Superannuation. What we can state with confidence is that, for the next twenty years, it would contribute substantially to the country's investment programme.

Speaking of the impact of costs, we read:

> It is perfectly true that our proposals would impose an obligation on the nation to allocate a larger slice of the national cake to old people. . . . Moreover, the devices we have recommended for safeguarding the pension against inflation will make it more difficult for the community to evade this obligation by permitting the real value of the pension to be eaten away by rising prices.

Also

> Moreover, it should be noted that the higher contributions paid under National Superannuation by the majority of the community would provide very large extra savings. . . . From the ordinary man and woman's point of view, these larger payments would, we believe, be acceptable because they are contributions towards a greatly improved old-age pension. From the community's point of view they would be savings which reduce the amount of our resources spent on immediate consumption thereby freeing further resources for capital investment.

As to the manner of investment of funds, we read:

> The Phillips Committee admitted that the investment of contributions would enable valuable assets to be constructed that would eventually furnish the means out of which pensions could be paid. We, therefore, believe that the investment policy of the National Pensions Fund should be controlled by trustees appointed by the Government who should have the same opportunities to carry out profitable investment of their funds as private insurance companies.[4]

The significant features of this statement of policy are these:

a) The recognition of the need for advance funding with consequent additional savings expected which, in turn, would be available to increase productivity.

b) The frank acknowledgement of the planned use of the pension funds to promote governmental influence, if not control, of private industry and thus promote the socialistic aims of the Labour Party. This policy of investing government controlled funds in private industry replaces the former Labour Party policy of outright nationalization of industries.

c) The strong feeling regarding the lack of substantial vesting in the majority of private pension plans.

"Retirement Pensions" and "The Pensions Problem"

Reflecting the views of the other side in this current debate in Great Britain, The Life Offices' Association and the Associated Scottish Life Offices have issued two booklets, *Retirement Pensions* in March, 1957, and *The Pensions Problem* in September, 1957.

[4] The report of the Phillips Committee was reviewed in *TSA* VII, 157.

Retirement Pensions discusses the present position of the state and occupational pension schemes (private pension plans) and indicates the vital issues raised in the current national debate. The basic issues are summarized as follows:

(1) Whether it is in the best interests of the country that the state pension scheme should be extended beyond the level of basic need;
(2) If the state scheme were so extended, whether the country should incur the additional burden that would result from including in the scheme the present pensioners and the older workers and so granting them additional pensions well beyond the amount that could be financed by their own and their employers' additional contributions; and
(3) Whether the methods used in financing the present basic pension would be suitable for the entirely different level of pensions contemplated.

With regard to a national compulsory pension program involving the accumulation of substantial funds, this study makes the following comments:

> The fund should, of course, be used to finance the economic development and the increased productivity that alone could provide a real backing for the promised future pensions. . . . And if investments were made on a large scale in private industry and commerce could those in control long remain free from political influence, or even direction, and would not this lead to undue state control and, ultimately, full control of large sections of industry?

As to the alleged weaknesses of private pension plans, we read:

> It is sometimes claimed that a state scheme of supplementary pensions is necessary to facilitate the mobility of labour and because existing occupational pension schemes do not cover the whole of the working population. But neither of these is a valid reason for state incursion into this field. Is there any reason to suppose that the state could administer supplementary pension benefits more efficiently and more economically than the present institutions which have made such a valuable contribution to the country's economy? Would it be a good thing to substitute the rigidity of a state scheme for the very considerable flexibility that is at present found so useful in fitting schemes to widely varying circumstances?
>
> If, despite difficulties, it were thought desirable in the national interest, the preservation of pension rights on a change of employment could, within reasonable limits, be introduced into private pension arrangements. A minimum standard of supplementary pension provision for each employed person (in addition to the state pension) might also be introduced—possibly in graded stages over a period of years bearing in mind the question of cost to the employer. These steps could be implemented by developing existing arrangements so that there would be a minimum of disturbance to existing pension schemes. The additional funds that would thereby be made available for investment would play their full part in the development of industry that is so necessary if in the years to come the standard of living is to be steadily increased and promised pension benefits are to be properly secured.

The Pensions Problem presents a statement of principle and a review of the Labour Party's proposals. The following summary from the booklet conveys its content.

I. General Principles

The state, with its compulsive powers and ability to levy the appropriate taxes, should not do more than ensure that the basic requirements of the elderly are met.

It is not for the Associations to assess the level of basic requirements of the elderly, but in their view the conception implies that state pension benefits should be uniform or nearly so.

The provision of pensions beyond the level of basic requirements should be left to voluntary arrangements under private schemes, soundly financed and flexible in nature.

II. The Labour Party's proposals

The main faults of the scheme can be traced to its size. It incorporates features which, while not inappropriate in a system of social-security taxation introduced to remedy a pressing social need, become quite inappropriate when applied to a scheme for the bulk of the nation's pensions.

Our conclusions are:

(a) that it would be much more costly than envisaged;
(b) that it would produce an unnecessarily extensive and consequently unfair redistribution of income;
(c) that it would give an immediate and continuing impetus to inflation both because of its method of financing and because of the provisions for uplifting benefits in line with rising prices;
(d) that it would be disadvantageous to many of the 8 million members of existing private schemes;
(e) that it would reduce personal savings;
(f) that it would give a sudden and severe shock to the national economy.

The Recent Swedish Situation

In Sweden, the problem of pension provision has been under study by government commissions in recent years. Three alternate plans were recently proposed and were voted on in a public referendum (the third in Swedish history) on October 13, 1957. As reported in the New York Times,[5] the basic issue was

whether any new contributory pension system should be national and compulsory or voluntary and negotiable between management and labor. . . . Basically, the issue is between private enterprise, as represented by the Employers Federation, and the Trade Union Federation. Aligned with the employers are the Conservative and Liberal parties. Backing the unionists is the Social Democratic party, of which the Trade Union Federation is the voting backbone and financial support. . . . The Social Democratic proposal would mean that some time between 1980 and 1990, a fund of about $1,200,-000,000 will have been built up and available for whatever use the Government might decide.

Under the joint proposal of the Liberal and Conservative parties, any and all privately negotiated plans would leave the contributory fund under the private industrial or business managements concerned.

In the referendum (as reported at the International Congress of Actuaries in New York), 46% voted for the compulsory Social Democratic party plan, 15% for small voluntary pensions (Agrarians), 35% for voluntary pensions based on collective agreements (Liberals and Conservatives) and 4% were blank votes.

[5] October 13, 1957.

About 70% of those entitled exercised their right to vote. The plurality for compulsory pensions is expected to impress governmental authorities.

In this connection it is interesting to note the following excerpt from an address of Mr. Marcus Wallenberg, President of the Stockholms Enskilda Bank in Stockholm to the International Industrial Development Conference in San Francisco on October 15, 1957:

> A serious warning should be sounded against the idea that the required capital supply could be secured by various forms of forced savings including such obligatory pensions as is now talked of in various countries. Such systems would not be effective without giving up basic freedom. Experiences from certain countries show how forced savings have failed to be anti-inflationary as the impact of this measure has been eluded by counteractions taken by people not wanting and not needing to accept the imposed hardships. Such countersteps could include bigger wage demands and diversions of savings from voluntary accounts to forced accounts. On the other hand a country like the Soviet Union has managed to extract forced savings with considerable success but at what price we all know.
>
> . . . we can—apart from moderating excessive trade union demands and election promises—do no better than limiting the public sector and drastically promoting voluntary savings to invest more to get more goods. This policy would have to include a general overhaul of taxation not to punish savings and productivity as now. Savings would be deductible from tax. It must pay to save and to work.

It seems clear that the pension issue being debated in Sweden is similar to that in Great Britain.

Critical Questions

Do these debates taking place abroad indicate more clearly the issues we face in this country as we make the basic decisions which will determine the direction we take in providing income maintenance for our inactive aged population?

Do these debates strongly indicate that, if a nation wishes to rely on a compulsory, contributory, government-operated pension system to provide essentially its full pension objectives with little or no reliance on voluntary individual and private employer arrangements, then, that nation must recognize and be ready to accept the fact that this can be done in one of *only two* ways: (*a*) by a system involving the accumulation of large reserves which must be invested by government in productive enterprises and thus combat inflationary forces, *or* (*b*) by a system financed mainly on a pay-as-you-go basis involving either a reduction in living standards of the active population or direct governmental financial support with inflationary potentials?

In brief, is the choice between a system which leads to a *socialistic* economic organization and a potentially *inflationary* pay-as-you-go system? I am sure that the vast majority of U.S. citizens would wish to know whether our choice is so limited. The *Suggestions for Research in the Economics of Pensions* should be of great value in finding the answer to this question.

In considering the path which limits OASDI benefits to basic protection and places considerable reliance on private plans, what needs to be done to make the latter more effective in playing their role?

One area of research suggested in the report by the National Bureau of Economic Research relates to the effect of pensions on labor mobility. We noted that the effect upon mobility of labor of the absence of vested pension rights is an important issue in the current debate in Great Britain. A paper entitled "Preservation of Pension Rights" by three actuaries (F. H. Spratling, F. W. Bacon, and A. E. Bromfield), presented in March, 1957, to the Institute of Actuaries, dealt with this issue. The authors first make clear that responsible discussion of pension right preservation is limited to the rights of persons with substantial service; they then conclude that the principle of preservation of pension rights would in practice apply only to a minority of persons changing employment and that such application would not lead to a dramatic increase in the numbers of persons changing employment after substantial service. Here are excerpts from the summary of the paper.

As to existing practice:

> Certain vocational pension schemes enable members of the professions concerned to change their employment from time to time without disturbance of their pension rights. .
>
> Arrangements of wide scope for preservation of pension rights exist within the public and quasi-public services; the cold-storage and the transfer value methods are both used. . . .
>
> It appears that only in a limited number of privately administered schemes does power exist for arrangements to be made for preservation of pension rights, whether by the cold-storage method or the transfer value method or both, and that where the power exists it is not always used.
>
> In life office schemes, the usual provision is for a member withdrawing voluntarily to be given an option to take a surrender value in cash in respect of his own contributions or the corresponding cold-storage benefits in the form of a paid-up policy, with, sometimes, in the latter event, the benefit of the employer's contributions in the same form. Most withdrawing members take a surrender value in cash. No provision is made for payment of transfer values from one scheme to another, other than the normal surrender values.

As to the possible enlargement of existing arrangements:

> Enlargement of the existing arrangements would require more widespread acceptance by employers of the principle involved, willingness of employees to forego payment of withdrawal benefits in cash and, if the transfer value method is to be used at all freely, removal or reduction of certain tax obstacles. The technical developments needed to enable really comprehensive arrangements to be made, include wider provision for the cold-storage and transfer value methods in privately administered schemes, and for the transfer value principle to be applied in life office schemes as well as the cold-storage principle.

As to costs:

> More general adoption of arrangements for preservation of pension rights would add to employers' costs, but the addition would be less than might at first sight be supposed.

It is interesting to note from the papers presented at the XVth International Congress of Actuaries that private pension plans in Denmark, Norway and Sweden generally provide for full vested pension rights in the form of paid-up pension (no cash) and that such liberal vesting appears to be a requirement for the plan to enjoy what we call, in the United States, "qualified" status.

In the United States, the absence of vested pension benefits upon termination of employment under many plans and its effect upon labor mobility has been a matter of concern by many. The Secretary of Labor has encouraged studies of the problem. Secretary Folsom, in the address cited above, made the following statement relating to private pension plans:

> Many more workers could and should be covered, and in many plans the benefits could and should be improved. Particularly, more plans should include better provisions for transfer of the worker's equity when he changes jobs.

The AFL-CIO is pressing both for increased social security benefits and for more liberal vesting in negotiated private pension plans.

Research is certainly needed in this area in order to examine the validity of the different points of view which exist. Beyond that, we should realize the futility of some of the so-called vesting provisions in existing plans. This futility arises from the availability and acceptance of cash by a terminating employee in lieu of a paid-up pension. This situation is found in many negotiated plans providing cash severance benefits as the "vested" benefit and in contributory plans where the vesting of employer-provided benefits is contingent upon the terminating employee not taking cash with respect to his own contributions. In the latter plans, probably a majority of terminating employees take a cash settlement that may be worth only a fourth or a third of the value of the total paid-up pension otherwise vested including employer-provided benefit. Certainly it should not be argued that social security benefits should be increased because of the improvidence of persons dropping out of contributory plans or because a union negotiated a cash benefit as the form of vesting instead of a paid-up pension. The terms of qualification of a pension plan under the Internal Revenue Code need re-examination in this respect with the view of encouraging real vested pensions and not cash benefits which probably divert funds, originally set aside for pensions, from the savings area to the spending area.

Item V of the *Suggestions for Research in the Economics of Pensions* is the tax treatment of pensions and the aged. Secretary Folsom has expressed the social insurance philosophy shared by many responsible citizens that social security benefits should be limited to a basic layer of protection and that private pension plans should have an important role. He has challenged such plans to do a more effective job. A vital way in which private pension arrangements can be much encouraged is to remove the tax barriers which now exist and which represent lines of income tax discrimination. A noncontributory employer-employee qualified trusteed noninsured plan enjoys complete freedom from income tax on the build-up of contributions and investment income and income tax is paid only as the retirement income is received. When we move to contributory plans, insured qualified plans and the situation of the self-employed and employees not covered by an employer plan, we encounter tax barriers and discriminations. The full effectiveness of a national purpose to stimulate savings for old age can be achieved only when these discriminations are removed, *i.e.*, (*a*) exclude employee contributions under qualified plans from taxable income, (*b*) make tax-exempt the investment income of life insurance companies attributable to qualified pension arrangements (whether employer-employee or self-employed), and (*c*) free from income tax contributions and investment income associated with the build-up of accumulations for retirement purposes (defined by statute) by self-employed and employees not covered by an employer plan. The entire retirement income should then be subject to income tax. Financial incentives of this kind not only are sound economically but encourage private efforts to solve the old age income problem as distinguished from a state program having either socialistic or inflationary potentials, or both. It may come as a surprise to many to know that the tax incentives for individual and private employer action outlined above have been adopted fully in a number of countries which we may think of as having gone farther in the direction of socialism than this country! These countries are Great Britain, Norway, Sweden and Denmark.

The tax treatment outlined here and its objective are directly in line with the findings of the subcommittee on Fiscal Policy of the Joint Committee on the Economic Report, as reflected in this excerpt:

> The basic problem is an inadequate level of savings out of current income. An ever-increasing volume of real savings is needed to meet the economy's requirements for replacement of plant and equipment under inflated prices and for growth based upon full exploitation of rapid technological advances. Fiscal and monetary policies should be directed toward encouraging a higher level of voluntary real savings under the present conditions of inflationary pressure.[6]

The research recommended by the report of the National Bureau of Economic Research is a vital necessity in finding answers to important questions including those raised in this review. The economic consequences of the particular direction taken in planning and financing old age income are of such great importance that we need the best objective research that economists, actuaries, and others in this country can provide.

RAY M. PETERSON

W. J. Cohen, *Retirement Policies under Social Security*, pp. xiii, 105, University of California Press, Berkeley and Los Angeles, California, 1957.

This relatively brief book contains a number of important historical facts about the OASI program that have been hidden and almost completely buried during the eventful two decades of its operation. Professor Cohen, now that he is no longer with the Social Security Administration, is perhaps in a position to report more fully on the development of the program than he was while in

[6] *New York Times*, June 27, 1957.

Government service. The book is one of a series of analyses made under the auspices of the Institute of Industrial Relations of the University of California as a result of a grant from the Rockefeller Foundation for a study of the problem of aging in an industrial society.

The scope of the book is somewhat broad in its interpretation of the subject. Thus, under the phrase "retirement policies," there are included not only the questions of the minimum retirement age and the retirement test, but also the disability retirement provisions. In this reviewer's opinion, the best feature of the book is the discussion of how the minimum retirement age of 65, which was effective for the first two decades of the program, was selected. This question is occasionally raised, and a thorough examination of the rather extensive social security literature prior to the publication of this book yielded no information whatsoever on this important matter. Much of the other discussion, such as that dealing with the disability provisions and the retirement test, has appeared in other sources, but nonetheless it is valuable to have it collected in one place. Actuaries will note with approval that the cost aspects of the various features discussed are given considerable prominence.

The first chapter sketches very rapidly the development of the OASDI system since its initial legislative enactment in 1954. Despite the brief space devoted to this subject, there are a number of interesting historical nuggets that have not generally been public information previously—for example, the factors influencing the enactment of the original legislation. There is also a good account of the history of the Clark Amendment, which would have permitted "contracting out" under OASI (a significant development that has not widely been recorded in social security literature).

The second chapter considers the reasons for selecting age 65 as the minimum retirement age and comes to the conclusion that there was no scientific, social, or gerontological basis for it. Rather, this seemed to be a nice round number and there was the general consensus that it was the most acceptable. Age 60 would have been too expensive from a cost standpoint, and age 70 would have seemed too remote to most persons to be politically popular. The third chapter deals with proposals for reducing the minimum retirement age and traces through the pressures that developed and that led to the changes of the 1956 Amendments. Again, the reasons for the final selection of age 62 for women are analyzed, with the conclusion being reached that cost factors were determining.

The fourth chapter, which is by far the longest in the book, deals with the provisions for monthly disability benefits. It traces the extensive proposals for disability benefits that were made almost from the inception of the program and that finally resulted in legislative enactment in 1956. A valuable chart is presented, comparing the disability provisions of the 1956 law with other major proposals, beginning with the 1948 Advisory Council recommendations. The legislative history of 1950, when the House passed such provisions but the Senate rejected them, and that of 1956 are given in considerable detail, with many interesting personalized sidelights, especially in regard to the 1956 Senate legislative maneuvering, the crucial factor in the enactment of these amendments. This will make interesting reading in retrospect after the experience under these provisions has developed, when otherwise memories would be dim as to the initial stages.

The fifth chapter deals with the history of the retirement test. Interesting information is given as to the initial inclusion of such a concept in the program, showing that it was almost only by chance that such a test was not eliminated in the legislative developments. The subsequent changes in both substance and philosophy are then described in detail, and also various data are given as to the operation of the retirement test. The sixth chapter discusses various proposals that have been made to eliminate the retirement test or to modify it in various ways, including the provision of an increment in the benefits for delayed retirement and varying the conditions with economic fluctuations. Cost aspects, of course, play a very important role in this connection.

The last chapter contains the author's concluding observations. Here, the long-range costs of the program are presented as a background for possible ways of liberalizing the benefits. Several liberalization packages are presented, ranging from a very costly one to a quite modest one. It is stated that although cost factors are important, the question of how much benefit cost should be handled through the social security system depends upon the attitude of the country at a given time—a feeling which, of course, can change over the course of years. The author concludes by urging that there should be an Advisory Council to review periodically the various benefit provisions, including those dealing with retirement policy (the Council provided by the 1956 Amendments is limited in its functions to financing questions).

ROBERT J. MYERS

G. Mathiasen, *Flexible Retirement*, pp. 226, G. P. Putnam's Sons, New York, 1957.

This book reports the results of a project on the "Criteria for the Continued Employment of Older Workers" which was conducted by the National Committee on the Aging of the National Social Welfare Assembly, through a grant from the McGregor Fund of Detroit. This project, which extended over a period of three years, was under the direction of a central advisory committee composed of eighteen persons. Actual work was performed by four technical subcommittees comprising 76 persons representing industrial medicine, industrial relations and personnel administration, physiology, psychology, rehabilitation, industrial engineering and labor unions. The objective of the project was stated in a Foreword to the book by Frank J. Sladen, M.D., Chairman, Committee of Trustees of McGregor Fund, as follows:

> to encourage the creation of adequate yardsticks for determining whether a worker should continue in employment or not, on the bases of health and ability to produce and the individual's desire as well as that of the employer.

The book contains the reports of the four technical subcommittees and also two additional chapters, not a part of the work of the subcommittees, pertaining to "Preparation for Retirement" and "Public Relations Aspects of Retirement Policy."

Another Foreword, by Mr. G. Warfield Hobbs, Chairman, National Committee on the Aging, summarizes the objectives and hopes of the National Committee in presenting this book, as follows:

> *Flexible Retirement* does not claim to offer a complete solution to all the problems of employment and retirement of older workers. We believe that once the problems are defined and the direction established, this solution will be worked out through experience in the years ahead. We believe each industry and, in fact, each company, will have to work out the details as they apply to its own circumstances. However, it is our belief that the experiences reported here, together with the suggestions for action which can be undertaken now and the proposals for continued research, will generate progress. We hope our collective endeavors will stimulate continuing efforts to devise efficient ways of utilizing the skills of older workers as long as there are jobs available and they are able and willing to work. We further hope that these efforts will bring about a better organized preparation for retirement, and a more rewarding life after retirement.

Essentially, the book concerns itself with four areas: (1) What is Flexible Retirement? (2) Does it work? (3) What are the problems? and (4) Where do we go from here?

The attempts to define "flexible retirement" are the weakest part of the book. This is probably understandable in view of the confusion which generally exists in identifying by label the various kinds of retirement under pension plans. The terms mandatory, compulsory, automatic, selective, discretionary and flexible, have been applied to various types of retirement. Yet, in many cases, the label does not fit the facts reflected either by the terms of the plan or by the way it is operated. This has tended to distort statistics about the prevalence of so-called compulsory retirement plans.

According to the definition used on page 24 of the text, flexible retirement plans are restricted to those which permit the employee to work as long as he wants to, with dismissal only for cause. However, the context of the book, and the supporting illustrations in the text, do not hold to this limited definition. Many companies that consider themselves as having flexibility in retirement practices actually do not conform to the definition. The context of the study appears to be more consistent with an approach that looks at flexible retirement as a concept, rather than as a label for a type of plan. In its broadest sense, then, flexible retirement refers to the determination of retirement on a basis other than by chronological age. Thus, it involves an evaluation of the worker and his abilities, and of jobs and their requirements.

The questions of (1) who can initiate the procedure for continuation of employment, (2) who bears the burden of proof of ability or disability, and (3) who makes the ultimate decision, are administrative problems in the operation of the flexible retirement concept and are not the deciding factors in the question of whether or not a program has the basic characteristics of flexibility.

The definition used in the book, being inconsistent with its context, implies flexibility in regard to age but inflexibility in regard to method of determination.

If the condition of flexible retirement depends on who is to determine retirement, much of the attraction in the flexible retirement concept may be reduced rather than enhanced. The advantages of flexible retirement (text at bottom of page 22) certainly relate to the broader concept of flexible retirement and not to the limited definition, which presupposes the lack of employer participation in determining time of retirement.

The book gives substantial evidence, through specific illustrations, of a positive reply to the question "Does it work?" It concludes on this point that companies which permit employees to work on under various flexible plans have on the whole "been favorably impressed with their experience." It points out the great differences in provisions and practices of programs successfully operating on a flexible retirement basis. Numerous examples are given concerning the characteristics of flexible retirement in practice—*i.e.*, (1) what is measured, (2) how is it measured, (3) who measures it, and (4) when is it measured. All of these characteristics involve evaluation of workers and their abilities, and of jobs and their requirements—the broad concept of flexible retirement.

The problems of flexible retirement are numerous. The book carefully points these out and comments on them by citing examples. It also presents a good case for further expansion of the flexible retirement concept.

The book is helpful on the "how to do it" questions of employers who are not practicing flexible retirement. It should be useful in arousing the interest of those who fail to utilize flexible policies merely because they feel there is no alternative to fixed retirement practices.

JAMES A. ATTWOOD

P. O. Steiner and R. Dorfman, *Economic Status of the Aged*, pp. xx, 296, University of California Press, Berkeley and Los Angeles, California, 1957.

This study of the aged was conducted by the Institute of Industrial Relations of the University of California with financial support from the Rockefeller Foundation. Data were obtained by arranging with the Bureau of the Census for a special nationwide sample survey, in April 1952, of persons 65 years of age and older. Use was also made of the reports on the population and labor force by the Bureau of the Census and the OASI reports on the national beneficiary survey in 1951.

The early chapters describe the age, sex, and other characteristics of the aged, their labor force and retirement status, and lastly their economic status and sources of income during 1951. Data are presented separately for aged couples, unrelated females, and unrelated males. For several reasons, the authors believe that this survey of the aged resulted in even greater understatement of income than surveys covering all ages. Thus, the aged are predominantly a low-income group with a strong tendency to understate their situation, they receive a larger share of total income from nonearned sources likely to be less fully reported than earnings, and lastly there is an incentive for those receiving old-age assistance and OASI benefits to understate income to an enumerator.

In order to measure the adequacy of their receipts, the authors set up standard budgets for the aged. By setting up reduced budgets for those living with relatives, a larger proportion is shown to be with receipts above a subsistence level than would otherwise be the case. However, in indicating sources of receipts, income in kind is omitted, thus producing an unwarranted proportion with no source of income and with low amounts of income. Among persons or couples owning their own homes, it would appear that the imputed *net* rental value should be added to cash income, but this is disregarded here. The conclusion drawn is that the economic position of unrelated females is particularly dismal since they lack employable skills, pension rights, and other benefits of labor force participation. There is no recognition of the real economic value (especially of many aged widows) of help given in the home of a relative which releases a younger homemaker for additional work outside of the home.

Consideration is also given to the value and distribution of total net assets, classified as to liquid and nonliquid types. The value of a home or other property in which less than $3,000 is invested appears (from the questionnaire) to have been disregarded in determination of assets. By not including cash values of life insurance and annuity policies in the liquid assets, nor present values of annuities in the nonliquid assets, an unduly pessimistic picture is painted. Barring inflation, the reviewer believes that the increased participation of married women in the labor market will very shortly alleviate a considerable portion of the overstated inadequacies in resources. The authors point out that when death of the husband occurs after retirement age, the OASI benefit for the aged widow will be but 50% of that received by the couple, while her expenses will be more than half of the former expenses for both. They fail to follow through with the corollary that other asset income will not so decrease and that many women will, therefore, be in a better economic position than before the death of the retired husband.

As to the "deplorable" lack of liquid assets, there is no suggestion, other than in a footnote, that some nonliquid assets could be turned into liquid assets and used for "continuing income"—for example, by moving from a large home to a smaller one. Also, if a business had not already been sold or if farm stock and equipment were owned by the farmer, the owner might still be classified by the survey as among those with thoroughly inadequate liquid assets. In the case, at least, of some unrelated males and females, the cash surrender value of life insurance could be turned into income. In the OASI beneficiary study, the value of life insurance was not included in assets (either liquid or nonliquid), but illogically a deduction was made for loans on life insurance policies. On the other hand, the treatment in this analysis is to add the face value of the policy to the total assets, resulting in an overstatement. Since the beneficiary study figures were used as a basis for the estimate of liquid assets, the result is that the face value is included in the residue or nonliquid assets. Actually, the cash value is the only present asset and is, of course, a liquid one. As the proportion of women with life insurance increases, so will the proportion of widows able to use their own insurance as income.

In their conclusion, the authors state that it is time for a careful re-examination of provisions of existing private and public programs, including the OASI retirement test. It is also suggested that OASI benefits should increase with the length of covered employment and with the deferment of retirement, thereby increasing the incentives for remaining in the labor force (but, in the opinion of the reviewer, decreasing the social adequacy aspects of the program since smaller benefits would be paid to those who were compelled, for one reason or another, to retire earlier). Nevertheless, the study shows that the main cause of withdrawal of men from the labor force is poor health and obsolescence of skills. The authors recognize that the question of cost must be given due consideration. They point out that, before long, a majority of the economic units over age 65 will be unrelated females, of which the great majority will be widows. Barring a rapid increase in labor force participation, most aged women will continue, for some time, to lack an occupational background for earnings. More attention, they contend, should be paid to survivor provisions of public and private pensions. Is not the curbing of inflation of even greater importance in this connection? The findings of this survey will be of help in studying the problems of the aged, but those using the results presented in the tables and charts should bear in mind the limitations previously indicated.

WELTHA VAN EENAM

Health Insurance Association of America, *Blue Print of a Program of Research, Education, and Information*, October 1956, and *A Summary—Blue Print of a Program of Research, Education, and Information*, Final Revision, pp. 40, July 1957.

The Blue Print carries the date of October 1956, yet it did not attain its final revision until July 1957. The appearance of the document at this time is a natural sequel to the events of nearly two decades. It may well prove to be an important signpost to the decade ahead for health insurance. The full title is *Blue Print of a Program of Research, Education, and Information Designed to Result in the Extension of Voluntary Health Insurance to Insurable Risks Not Now Insured and to Make More Adequate the Insurance Benefits Now Provided.*

The rapid recent growth of voluntary health insurance in the United States is a fact of record. It is evidence of public recognition of need and of concern that means of protection be found. However, the forces that have led many to take voluntary action have precipitated the arguments of others for compulsory means. The Beveridge Report in 1942 led England into its National Health Service in 1948. In this country it gave further encouragement to advocates of compulsory health insurance, among whom have been two previous Presidents. The present administration has supported voluntary rather than compulsory measures but has urged a federal reinsurance program in the belief that it would encourage insurers to undertake more experimentation and risk-taking to the end that more people would more rapidly become insured with more adequate benefits.

Against this background an *ad hoc* committee was established from among the leaders in the health insurance field to review the position of the industry, to confer with government officials, and to reach what conclusions it could. Significantly, it held that a sound industry program of research, education and information would make decided progress toward the desired goals of more insured risks and more adequate benefits. Thereupon, it suggested to the newly formed Health Insurance Association of America that it undertake to provide a blueprint of just such an industry program.

This document was prepared by the staff of the Health Insurance Association of America under the guidance of J. F. Follmann, Jr., Director of Information and Research. It reviews, by way of introduction, the evolution in medical economics and in the provision of medical care, the consumer in America and his habits, and the role of private voluntary insurance and its challenge. It then discusses the two main objectives of the assignment. The first is the extension of voluntary health insurance to insurable risks not now insured. The problem here is broken down into its components—for example, older-aged persons, the rural population, the substandard risk.

The second of the two main objectives is to make more adequate the insurance benefits now provided. Here again subsections of the problem are surveyed—among others, coverage for para-hospital care, coverage of dental care, coverage of preventive care.

The document then discusses means of increasing the effectiveness of insurance through avoidance of overinsurance and overutilization of insurance, and through loss prevention. It closes by commenting on the further education of all parties concerned.

In structure the Blue Print is well organized. The discussion of each subsection is followed by specific recommendations and by an extensive bibliography of source material. One flaw exists in the system of page identification. The discussion pages of each subsection are separately identified and numbered. The pages of recommendations and bibliography are unnumbered. The utility of the document would be much improved if the pages were given the conventional numbering sequence and if each of the 42 recommendations were given its own number in the text. However, those who must read hurriedly or not at all are helped by the publication of the separate summary of the Blue Print which gives in condensed form its salient points, but without the specific recommendations.

In each subsection the review is comprehensive of the situation as it has developed and as it now exists. As stated in the preamble, much of the material is factual but the Blue Print is not afraid to quote opinion as well, sometimes controversial or contradictory.

The test, of course, of ultimate value of the Blue Print lies in the recommendations, which number 42 in all. They include those whose importance and immediacy is obvious (a study of the older age population group, its medical care needs and the means by which these are financed) and others where action is perhaps for later determination (an over-all study of the uninsured population).

All in all, the Blue Print represents a studied effort to evaluate this business of health insurance, to identify the road ahead and the challenge it provides. Significantly, the industry has already given a high priority to many of these suggestions.

C. MANTON EDDY

*O. W. Anderson, *Voluntary Health Insurance in Two Cities*, pp. xiii, 145, Harvard University Press, Cambridge, Mass., 1957.

The objective of this study was to obtain data to accurately measure the accomplishments of present hospital and medical prepayment and insurance coverage. The survey, which was conducted by the National Opinion Research Center of the University of Chicago, was sponsored and financed by the Health Information Foundation.

This study is of considerable interest because of the careful methods used to secure representative samples, as described in Appendix C by Eli S. Marks of the National Opinion Research Center. These sampling methods appear to be far better than those previously seen in this type of survey. The results are presented quite objectively and many of the tables are of definite actuarial interest. Well worth noting are Tables A24 and A25, pages 84 and 85, which indicate rates of admission and average length of stay by age and sex for hospital and surgical procedures. The opinions and attitudes expressed by the families sampled, on pages 42 to 45, offer a valuable insight for those interested in expanding existing medical care coverage or developing new forms of coverage. The author makes it fairly clear that the attitude of the general public toward insurance covering small expense is quite different from that of the minority whose highly frequent utilization not only increases the average cost of coverage but causes them to express an insistent preference for "Major Medical" insurance designed primarily to cover heavier expenses.

EDUARD H. MINOR

Prolonged Illness Absenteeism, Summary Report, pp. xiv, 237, Research Council for Economic Security, Chicago, 1957.

This report, five years in completion, was presented as embodying "all the ingredients needed for a successful attack upon prolonged illness." One of its principal aims was to "provide pertinent data that would assist the efforts on the part of insurance companies and other prepaid medical care plans to provide coverage for prolonged or catastrophic illness." Only 145 employers contributed data for the survey period and 25% of the life-years of exposure were provided by only four of these groups. Over 50% of the contributions were from the Central States and less than 5% from the West. The exposure at ages 65 and over was too small to produce any reliable results and the exposure for employed females was disproportionate to that expected for a representative sample. Although the tables on pages 53 to 58 are of some interest, the estimates for total illnesses, manpower and financial losses in the total population appear to be exaggerated and unreliable since they are based on small and nonrepresentative samples. Estimates of the cost of medical care as shown in Chapters VI and VII seem to be overstated and the statistical applications are rather ambiguous. Thus, the major medical claim cost data hardly can be considered pertinent toward the development of coverage for catastrophic illness.

EDUARD H. MINOR

E. C. Hammond and D. Horn, "Smoking in Relation to Death Rates," read at the Annual Meeting of the American Medical Association, New York City, June 4, 1957.[1]

Many reports have previously been published both here and abroad on the subject of lung cancer and the role that smoking may play in the increased death rate from this form of cancer. The previous studies, in many instances, were based upon records of individuals who were already afflicted with cancer; their conclusions have been challenged on the grounds that the population under observation was obviously not a normal one. The present study, which is a continuation of one previously made by the same authors,[2] is based as far as possible upon a group who were in normal health, and covers the general mortality rate of smokers as well as the death rate from lung cancer.

No report previous to the present one has aroused so much controversy among both the informed and the uninformed. The clamor increased with the publication in July 1957 of a statement by the U.S. Public Health Service which said, among other things: ". . . it is clear that there is an increasing and consistent body of evidence that excessive cigarette smoking is one of the causative factors in lung cancer."[3] The report was again in the limelight when a Subcommittee of the House Government Operations Committee started to investigate the possibility of false advertising claims on cigarette filters.[4]

The study by Hammond and Horn, which is the most elaborate yet made, presents an analysis of death rates in relation to smoking habits of 187,783 men who were traced for an average period of 44 months. These exposed were selected by volunteer researchers of the American Cancer Society. A specially designed questionnaire was completed by each individual entering the study—the individuals were white males between the ages of 50 and 69 and were apparently in good health. Nine states—California, Illinois, Iowa, Michigan, Minnesota, New Jersey, New York, Pennsylvania and Wisconsin—were

[1] An extended version of this paper is scheduled to be published in the *Journal of the American Medical Association.*

[2] E. C. Hammond and D. Horn, "The Relationship Between Smoking Habits and Death Rates," *Journal of the American Medical Association*, vol. 155, p. 1316, August 7, 1954.

[3] Release to newspapers dated July 12, 1957.

[4] Legal and Monetary Affairs Subcommittee of the Committee on Government Operations of the House of Representatives, 85th Congress (Congressional Record Reports for July 18–22, 1957), and *New York Times*, July 20, 25, 26, and 27, 1957.

involved. The lives were traced from January 1, 1952 through November 1, 1955. Altogether, 11,870 deaths were reported in the study, so that statistically the results in the broader groups at least are significant.

The death rate from all causes among the cigarette smokers was 68% higher than the death rate of a comparable group of men who never smoked and, among the cigarette smokers, the death rate was directly associated with the amount of smoking. Further, the cigarette smoking group had a higher death rate than did groups of cigar smokers and pipe smokers, although both of these showed higher rates than that of the nonsmoking group. A further breakdown showed an improvement in the death rate of a group who had given up smoking.

If there be any question about these general results it might take the form of suggesting that there was a preselection on the part of the researchers, that the nonsmokers were possibly a better than average group of risks. The improvement in the death rate with a change in smoking habits might not be significant because we do not know why the individuals gave up smoking, and the group studied may be survivors from a highly impaired original group. While, however, a bias could possibly exist in the statistics it could hardly account for the wide divergencies in the death rate.

This inference, which would appear to be sound, was more or less ignored in discussions of the report which concentrated on the analysis by cause of death. The analysis showed that the death rate from cancer (all forms) was 1.97 times the expected on the basis of the nonsmoking control group. For diseases of the heart and circulatory system the ratio was 1.57. There were 448 deaths from lung cancer, only 15 of which were from the nonsmoking group. The age standardized death rate for carcinoma of the lung in nonsmokers was 12.8 per 100,000 per year, as compared to 127.2 for cigarette smokers. The report summarized the breakdown by causes of death as follows:

> Having found a considerable relationship between cigarette smoking and total death rates, we then sought to determine what diseases were involved. Our available source of information was cause of death as recorded on death certificates supplemented by more detailed medical information on cases where cancer was mentioned.
>
> An analysis of the data showed the following relationships with cigarette smoking:
>
> 1. an extremely high association for a few diseases such as cancer of the lung, cancer of the larynx, cancer of the esophagus, and gastric ulcers;
> 2. a very high association for a few diseases such as pneumonia and influenza, duodenal ulcer, aortic aneurysm, and cancer of the bladder;
> 3. a high association for a number of diseases such as coronary artery disease, cirrhosis of the liver, and cancer of several sites;
> 4. a moderate association for cerebral vascular lesions.

This high degree of statistical association between lung cancer and heavy cigarette smoking has been found in other investigations. Statistical association does not necessarily mean that smoking causes lung cancer, but the figures and the fact that various carcinogenic substances are present in tobacco smoke, although in minute quantities, give strength to the belief that the high death rate is more than a matter of statistical association.

The authors of the report took great pains to avoid the obvious pitfalls. The entry age limits were selected presumably because cancer does not generally develop at an early age. Where the cause of death was given as cancer, supporting medical microscopic diagnosis was obtained wherever possible. The criticism had been made of previous reports that errors in diagnosis were frequent and could distort the statistics. Further, a division and comparison as to rural and urban exposures showed lower over-all rural death rates, as might have been expected, but still produced a higher death rate among smokers than among nonsmokers, even in nonurban areas.

There is some question as to whether the states selected may not have created a bias in the number of deaths because of their better medical facilities for diagnosis and treatment of cancer and better death registration. Female lives were not included in the study, presumably because the incidence of lung cancer in females is much lower than that among males.

There is no question about the validity of the statistics, but the use of a control group rather than an absolute standard makes the results of little value from a life insurance point of view. The life insurance underwriter would like to see a death rate measured against an over-all standard group and not against the best mortality. The possibility that the selection of the nonsmoking group created an artificial standard has already been mentioned, and in the report a comparison with the U.S. white male death rates for the same period as the study produced inconsistent results, showing better rates in the early period and worse rates in the later. No mention is made of occupation, although presumably neither group was weighted by occupations with a high cancer death rate. Quite properly, therefore, this report is useful as a demographic and public health study and, irrespective of arguments about the causes of death, there is no question about the higher death rate of smokers. Further, the high death rate from lung cancer cannot be explained away by statistical aberration, and the high death rates from other causes should not be ignored.

In Great Britain a similar study has been made on a group of doctors, and this has produced results similar to the U.S. report, as well as a warning from the Medical Research Council pointing out the increase in the incidence of lung cancer and commenting on the possible causes, as follows:

> The extent and rapidity of the increase in lung cancer point clearly to some potent environmental influence which has become prevalent in the past half-century and to which different countries, and presumably also men as compared with women, have been unequally exposed. The pattern of incidence of the disease rules out any possibility that the increase can be due, in a substantial degree, to special conditions, such as occupational hazards, affecting only limited groups. It is necessary to seek some factor or factors distributed generally throughout the population, and in considering the possibilities it must be borne in mind that a very long period, 20 years or more, may elapse between exposure to a carcinogenic agent and the production of a tumor. From the nature of the disease attention has focused on two main environmental factors (1) smok-

ing of tobacco, and (2) atmospheric pollution—whether from homes, factories, or the internal combustion engine.[5]

Various hypotheses have been advanced to explain the increase in lung cancer. One is that smoking merely determines the site in which cancer develops. There seems to be little basis for this assumption. Another is that there is some hereditary, constitutional link between people who are cancer-prone and people who become heavy smokers. Apparently, in following cancer strains in mice there is some evidence of a hereditary association, but the evidence is somewhat thin.

The theory which has been given most prominence is that of stress. It suggests that cancer is one of the stress diseases, along with cardiovascular diseases and ulcers. On this hypothesis, smoking is another evidence of stress and the results of the study therefore are only what might be expected. If cancer is a stress disease we might expect that its incidence would be the same in all stress groups. A brief review of the experience by cause of death in the *1951 Impairment Study* does not show any consistent cancer pattern among any of the broad groups investigated. It might be interesting, in future studies, to analyze the cancer deaths by site to see if the pattern follows that of this report in any group. The stress disease theory is still a subject of debate in the medical profession and to a layman it is doubtful if such a simple explanation would be valid in all instances.

There is no question but that a considerable amount of work yet remains to be done in this field. The American Cancer Society, the American Heart Association, the National Cancer Institute and the National Heart Institute appointed a study group on smoking and health in 1956, and their report[6] points out that additional research is needed to clarify many details and to aid in the most effective development of a program of lung cancer control. They stated that we need more information as to the nature of carcinogenic factors in tobacco smoke as well as suggesting that these be eliminated if possible, and also that we need more information as to the role of atmospheric pollutants and additional environmental factors in the causation of cancer. The report of the study group, which did not receive anything like the publicity of the present report, is well worth reviewing, as is an editorial in the January 1957 number of the *Annals of Internal Medicine*. More light on this subject may come from a study under way on records of the Veterans Administration.

ANDREW C. WEBSTER

*Electronics Seminar Committee, "Application of Electronic Data Processing Equipment to Office Operations," *Transactions, XVth International Congress of Actuaries*, vol. 3, pp. 159, 1957.

This volume reports, for the benefit of others, the current viewpoints and methods of those companies which have already started using electronic data processing systems. While naturally concerned for the most part with life in-

[5] Statement by the Medical Research Council, "Tobacco Smoking and Cancer of the Lung," *British Medical Journal*, June 29, 1957, p. 1523.

[6] "Smoking and Health, Joint Reports of the Study Group on Smoking and Health," *Science*, vol. 125, p. 1129, June 7, 1957.

surance procedures, the report nevertheless represents one of the most complete and authoritative publications in the field of electronic data processing. In many respects the conclusions are broad enough to apply to the application of electronics to any area of clerical work. It not only gives a good picture of the equipment and procedures being used, but it also presents the rationale behind them, along with actual examples of procedures in use and the pros and cons of the various alternatives available. Part I was prepared mainly as a means of directing attention to the problems and difficulties encountered in the primary stages, and the various methods which may be employed to cope with them. Part II describes the life insurance practices of several countries and discusses the types of equipment available and their use.

Part I, which is also being published as the current Report of the Committee on New Recording Means and Computing Devices of the Society of Actuaries, is presented in five sections. Section I summarizes the administrative problems facing life insurance companies today, how they might be alleviated by the use of electronic data processing systems and what systems are currently in use, not only in the life insurance industry but in all industries. Section II deals with the new plans being developed. It starts with a summary of the basic guiding principles being followed in setting up new procedures and continues with an analysis of the systems being developed. These systems vary according to the company's attitude, with regard to policy service, toward:

1. Handling of "on line" operations
2. Handling of "interrogations"
3. The share of the work load in field offices
4. The processing cycle employed
5. The manner in which historical records are maintained.

A similar discussion is concerned with the various methods used for conversion to these new procedures and with the approaches to equipment selections to date.

Section III describes, in considerable detail, for one company with a great deal of experience, the methods used in the development and installation of their electronic procedures. An account is first given of the recruitment and training of personnel. Then follows an actual illustration of how a function can be successively broken down into smaller parts until the last breakdown is in sufficient detail for a programmer to code the operations in machine language. The next section describes how the burden of coding in machine language can be lightened through the use of automatic programming devices. After showing how one automatic programming technique is used and applied to a simple problem, it discusses some techniques in use by other companies and also summarizes their advantages and disadvantages. The last section describes the case histories of four companies, including an account of the work areas converted to electronic processing, the rationale behind the procedures and the conversion problems, and concluding with an appraisal of the results achieved.

The first two sections of Part II describe the Ordinary and Industrial insurance practices which affect data processing requirements in various countries. Section III presents a concise, but complete, summary of the evolution of data processing systems. A brief history of the developments to date is followed by a general description of the equipment available today and then by a more detailed summary of the characteristics of a typical large-scale magnetic tape system and of a medium size punched card system. The section concludes with an outline of what can be expected in the way of future developments on the basis of answers to questionnaires sent to the research officers of 40 equipment companies in the field of electronics.

The more basic differences between punched card and magnetic tape systems are discussed in Section IV. Besides comparing such items as accuracy, security, flexibility and costs, the section concludes with a note of caution by showing some of the reasons why the costs of developing and installing new electronic procedures are frequently underestimated. The last section has an excellent discussion of the relationship between electronic equipment and integrated data processing systems. A clear distinction is made between three basic types of operations, "random updating," "cyclic," and "random inquiry." This section also covers the more important principles of data processing in a life insurance company and concludes with a brief discussion of approaches to integrated data processing in other industries.

The report as a whole is a "must" for anyone even remotely concerned with data processing, not only in the insurance industry but in all industries. It presents a very comprehensive statement of the basic principles of electronic data processing as they are beginning to emerge from considerable actual experience on magnetic tape systems.

C. G. GROESCHELL

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—Accident and sickness insurance; 4—Social security; 5—Other topics.

References to allied subjects will be found in the following publications: *Mathematical Reviews*, published by the American Mathematical Society—Subjects: Theory of probability, mathematical statistics, mathematical economics, various other mathematical topics; *Monthly Labor Review*, published by Bureau of Labor Statistics—Subjects: Cost and standards of living, employment and employment services, fringe benefits, handicapped, industrial hygiene, industrial relations, labor organization and activities, manpower, older workers and the aged, personnel management, social security (general); *Population Index*, published by Office of Population Research, Princeton University, and Population Association of America—Subjects: Mortality, fertility, marriage, divorce, the family, various other demographic topics; *Social Security Bulletin*, published by Social Security Administration—Subjects: Retirement and old age, employment, maternal and child welfare, health and medical care, various other topics in social security; *Journal of the Institute of Actuaries*—The review section contains digests in English of articles appearing in foreign actuarial journals.

ACTUARIAL AND OTHER MATHEMATICS, STATISTICS, GRADUATION

J. E. Walsh, "A Monte Carlo Technique for Obtaining Tests and Confidence Intervals for Insurance Mortality Rates," *Symposium on Monte Carlo Methods*, p. 265, John Wiley and Sons, New York, 1955.

The author summarizes this article as follows: "Observed insurance mortality rates ordinarily are based on units which are not statistically independent (policies, amounts, etc.) and involve lives which are not completely homogeneous. Reasonably accurate determination of the probability properties of these observed rates requires some method of allowing for this dependence and heterogeneity. For most investigations, cost of the method used is a major consideration. Since the amount of data is nearly always large, a procedure involving the recording and processing of additional information can be very expensive. This paper presents a method whereby reasonably accurate tests and confidence intervals can be obtained for the expected value of an observed rate without additional information and with little extra cost. The procedure consists in introducing a supplementary probability process with known properties (a Monte Carlo technique). The price paid for using this method is a low efficiency for the resulting tests and confidence intervals (usually in the neighborhood of 5 to 25%). However, the amount of data ordinarily is large enough to yield useful results even for efficiencies this small. Also, the method is applicable to any situation where the observed mortality rate and the number of units exposed to risk are known (in particular, completed mortality studies where obtaining further information is either impossible or impracticable)."

N. L. Johnson and P. G. Moore, "Applications of Sequential Methods to Mortality Data," *Journal of the Institute of Actuaries Students' Society*, vol. 14, p. 84, February 1957.

The authors first describe briefly the sequential probability ratio test, devised by Wald, which is designed to test an assumption on the basis of successive samples as they are drawn, at a saving in time and expense. The method is adapted to the problem of selecting a mortality table, from among those already available, to describe the experience of a life office. In this process a table which is first selected is compared with another which is uniformly higher than it. The four examples which are chosen to illustrate the general method highlight several features. First, the method has great flexibility. This is illustrated in several ways. Thus, the authors use the method for testing an ultimate table against an alternative select table. Another example is concerned with the problem of choosing, for the description of an experience, between mortality rates invariant with time and mortality rates changing linearly with time. The latter example also illustrates how to choose from among three tables, one of which lies intermediate between the other two. Second, the number of years of experience which need be accumulated before a decision is reached regarding the suitability of a proposed mortality table is not predetermined; this period is a random variable. Lastly, an example shows that the sequential test, like all other statistical tests, can lead to a wrong conclusion. This, of course, is in the nature of all statistical tests.

*S. B. Richmond, *Principles of Statistical Analysis*, pp. xii, 491, Ronald Press, New York, 1957.

This is an introductory text designed for readers whose mathematical training has been limited to secondary school algebra. It is divided into the following major sections: Probability and Theoretical Distributions, Statistical Inference, Descriptive Statistics and Forecasting. An extensive glossary of equations provides concise verbal descriptions of formulas used in the text. The appendixes consist of 15 tables commonly used in statistical analysis.

J. G. Kemeny, J. L. Snell, and G. L. Thompson, *Introduction to Finite Mathematics*, pp. xi, 372, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1957.

This book has nothing to do with finite differences (as the title might suggest), but is intended as a text for a radically new type of mathematics course for college freshmen. The title is supposed to indicate that consideration is limited to "*finite* problems, that is, problems which do not involve infinite sets, limiting processes, continuity, etc." Nevertheless, the infinite power of a stochastic matrix is introduced on p. 220. Topics discussed are mathematical logic, theory of sets, permutations and combinations, probability theory, vectors and matrices, and linear programming and the theory of games. A final chapter is concerned with "applications of mathematics to the behavioral sciences." Several colleges and universities have introduced courses of this general type, and a lively controversy as to their merits has developed among college teachers of mathematics. In general, the new type of course seems to be favored at privately endowed institutions with high standards for admission and opposed in the state universities. Proponents argue that the new courses are better calculated to arouse interest and that they provide information more likely to be useful to the student, but others are of the opinion that the mathematical concepts involved are more difficult for the average student to grasp than the content of the traditional course, and require a degree of intellectual maturity which is likely to be found only in a carefully selected group. A Committee on the Undergraduate Program of the Mathematical Association of America is sponsoring the writing of a text, *Universal Mathematics*, which is in process of revision and not now available for examination. It is understood to be along similar lines but less "radical" in its approach than the present book.

Life Insurance and Annuities

S. Benjamin and C. W. Bennett, "The Application of Elementary Linear Programming to Approximate Valuation," *Journal of the Institute of Actuaries*, vol. 84, Part I.

This paper shows how to calculate the limits within which the reserve must lie if certain details of the distribution of business are unknown. The calculation is applicable to blocks of business where only certain aggregate functions of the distribution, such as total insurance in force and total premium in force, are known. For the particular example studied—a block of endowment at age 65 policies in force nine years and issued at ages 17 through 49—the range of reserve limits was only 2.35% of their mean value. This range was further reduced to 1.03% by imposition of the restriction that the in-force for each issue age could not exceed the amount of insurance originally issued at that age. A final single value of reserve was estimated on the assumption that persistency was a linear function of age. This estimate was only .03% less than the actual reserve calculated from a detailed classification. The closeness of this approximation was believed due to the facts that (*a*) the reserve factors were approximately a linear function of premiums as both varied with age, and (*b*) persistency was approximately a linear function of age. Various "established" methods of approximate valuation are examined, and general principles of approximate valuation are proposed.

*H. S. Redeker and C. K. Reid, II, *Life Insurance Settlement Options*, pp. xxi, 248, Little, Brown and Company, Boston, 1957.

This book was written at the request of the American College of Life Underwriters for use as a text in its educational program. It describes settlement options and their uses in programming, discusses the variations in company practices and the mechanics and practical considerations in setting up programs, and also covers related legal and tax aspects. The stated purpose was to bring together, in one volume, material concerning the settlement options already to be found in existing books and papers, the thoughts of experts in the field who were consulted in the preparation of the book, and the ideas of the authors of the book, who are, respectively, General Counsel, The Fidelity Mutual Life Insurance Company, and Senior Consultant, Life Insurance Agency Management Association.

U.S. Treasury Department, "Regulations Relating to Annuities, Treasury Decision No. 6211 as amended by Treasury Decision No. 6233," pp. 1–74, Internal Revenue Service Publication No. 76 (Rev. 6-57).

The regulatory provisions in this pamphlet are a part of the Income Tax Regulations to be issued under the Internal Revenue Code of 1954. It contains the statutory provisions relating to income taxation of annuities and the corresponding regulations. The latter include four actuarial tables based on the 1937 Standard Annuity Table with ages set back one year (6 years for female lives). Table I gives values of $e_x^{(12)}$ for male lives at ages 6 to 111. Tables II and IIA give values of $e_{\overline{xy}}^{(12)}$ and $e_{xy}^{(12)}$, respectively, for all combinations of two male lives at ages 6 to 99. Table III gives values of $100\ (1 - \mathring{e}_{x:\overline{n}|}/n)$ for $x = 6$ to 108 and $n = 1$ to the smaller of 35 and $110 - x$, where x is the age of the male life. This quantity represents the value for income tax purposes of the refund feature in a refund annuity expressed as a percentage of the investment in the contract or the total amount guaranteed as of the annuity starting date, whichever is smaller. The value of the refund feature as so determined is to be deducted from the investment in the contract in order to arrive at the net investment for income tax purposes. Table IV shows temporary expectations of life (understood to be values of $\mathring{e}_{x:\overline{n}|}$) for male lives ($x$) aged 0 to 86 and for $n = 1$ to the smaller of 30 and $100 - x$. The same tables are used for female lives, considering a female life equivalent to a male life 5 years younger.

F. H. Spratling, F. W. Bacon, and A. E. Bromfield, "Preservation of Pension Rights," *Journal of the Institute of Actuaries*, vol. 83, Part 3, No. 365, p. 173, 1957.

This is the report of a Committee appointed by the Institute to study the actuarial and other problems associated with the preservation, or vesting, of pension rights in the United Kingdom. It includes a brief summary of the existing vesting practices with respect to vocational, public service, self-insured, and insured plans, and indicates that although there are such provisions available under vocational and public service plans, there are practically none under the self-insured plans, nor under the insured plans beyond the pension rights purchased by the employee's own contributions. There is also a discussion of points to be considered in extending these rights to the other types of pension plans and, in very general terms, a consideration of the various aspects of two methods of providing for such rights—the paid-up deferred annuity and the transfer value methods. The advantages and disadvantages of each of these two methods are discussed with respect to tax position, actuarial and administrative considerations, and other pertinent points.[1]

K.-G. Hagstroem, "Can Life Assurance—and Especially Pension Schemes—Be Built on Variable Premiums? And Can Inflation Risk Be Covered?" *Skandinavisk Aktuarietidskrift*, Haft 3–4, p. 173, 1956.

The author advocates a method of financing a contributory retirement plan under which a substantial portion of the funds would be invested in equities and "bonuses" would be declared from time to time, based on the appreciation of the equity investments. The employer would also guarantee a fixed rate of interest accumulation on the funds, and would make up the difference when actual interest earnings fall below the guaranteed rate. The result would be similar to that of a combination of variable annuities and fixed-dollar annuities, although the mechanics of operation would be different. A mathematical model of the operation of such a system is developed.

Pension and Profit-Sharing Plans and Clauses, pp. 445, Commerce Clearing House, Inc., Chicago, 1957.

This volume consists of the full texts of 20 pension and profit-sharing plans, followed by a wide selection of specific clauses selected from typical existing plans, arranged according to subject. Explanatory material is limited to a brief explanation of the purpose of including such a clause in a plan, a brief indication of some of the legal requirements, and an indication of the general type of plan in which the specific clause was found. All of the material included was selected from existing plans which presumably conform to all current laws and regulations.

*J. B. Maclean, *Life Insurance*, 8th edition, pp. xi, 558, McGraw-Hill Book Company, New York, 1957.

The author states: "In preparing this edition, an effort has been made to simplify certain parts of the text which have proved difficult for some readers. This has resulted in substantial rewriting and shortening of the discussion of the more technical topics. Thus the former chapter 'Modified Reserve Systems' has been greatly condensed and has been combined with the chapter 'The Reserve.' The chapter in previous editions 'The Annual Statement,' which dealt almost exclusively with the Convention Blank, has been replaced by a new chapter, 'Financial Statements,' which deals with the subject more generally and includes a discussion of the usual types of financial statements included by the companies in their annual reports to policyholders. The chapter 'Fraternal Life Insurance' has been added, replacing the short reference to this subject in previous editions. A new feature of this edition is the addition of a set of review questions at the end of each chapter."

"Measuring the Risk of Coronary Heart Disease in Adult Population Groups: A Symposium," *American Journal of Public Health*, vol. 47, pt. 2, pp. 63, April 1957.

The first paper of the symposium contains introductory remarks by Dr. Paul Dudley White. The second paper reports on a four-year follow-up experience of a continuing

[1] See page 480 for a further discussion of this report.

survey of heart disease in Framingham, Massachusetts, among persons presumably free of disease at initial observation. The sample consists of a randomly selected population aged 30–59 in 1950, who were given subsequent biennial examinations. The population at risk totaled about 4,500. Among them 97 were free of arteriosclerotic disease at first examination, but developed it in the subsequent four years of observation. The four-year incidence rate per 1,000 for males was 12 at ages 30–44 and 58 at ages 45–62; for females, there were no cases under age 45, and the rate at ages 45–62 was 29. Data are also presented with regard to blood pressure and build.

The third paper describes a prospective study of degenerative cardiovascular disease among about 2,000 male office workers in Albany, New York, at ages 39–55. On the initial survey, 70 cases of ischemic heart disease were found, the prevalence rate being 36 per 1,000. During the next two examinations within the subsequent 31 months, 40 new cases of ischemic heart disease developed; the annual incidence rate was 9 per 1,000.

The fourth paper is concerned with the follow-up of a sample of Los Angeles City Civil Service employees, chiefly males, who were observed clinically for two to three years. The initial examination yielded a prevalence rate of 27 per 1,000 for coronary disease in males, including combined coronary and hypertensive heart disease; this rate ranged from 2 per 1,000 at ages under 40, to 88 at ages 55–70. The annual incidence rate of coronary disease among males with a normal heart on entry was 1 per 1,000 under 40 years of age, 8 at ages 40–54, and 29 at ages 55–70. The fifth and last paper describes an epidemiological investigation of coronary heart disease in the California Health Survey. Prevalence rates for coronary heart disease are presented according to age and sex.

Accident and Sickness Insurance

B. Benjamin, "The Measurement of Morbidity," *Journal of the Institute of Actuaries*, vol. 83, Part 3, No. 365, p. 225, 1957.

From the author's synopsis: "The paper sets out to provide background information of current developments in the measurement of disease prevalence and behavior (that is, of epidemiology in the wider sense). . . . After a short discussion of the meaning of sickness a review is given of different types of measurement, adapted to the manner in which sickness presents itself, including infectious disease notification, cancer registration, private and social insurance records, industrial sickness absence records, sample surveys, hospital in-patient discharges, general practitioner consultations and mental disease records."

William Lougheed Associates, *Underwriting Canadian Health: An Economic View of Welfare Programs*, pp. viii, 165, Canadian Chamber of Commerce, Montreal, and Canadian Life Insurance Officers Association, Toronto, 1957.

This publication presents the results of an economic study, commissioned by The Canadian Life Insurance Officers Association and The Canadian Chamber of Commerce, into the economic and social implications of government welfare programs in Canada. It sounds a warning that government spending on welfare cannot continue at its present rate of growth without interfering with the national economic balance. In what is termed a "collision course," the report points out that if government welfare spending and the nation's gross national product were to continue mounting at their present rates, by 1980 the former would amount to 24% of G.N.P. as compared to 6.8% in 1955. It is made quite clear, however, that the expenditure data are not predictions of things to come but serve to illustrate incompatibilities between the (assumed) growth of national output and government policy in the welfare field. While the report deals with the general welfare scene, special attention is devoted to hospital insurance and the cost pattern of various provincial plans now in existence.

Department of National Health and Welfare, *Voluntary Hospital and Medical Insurance in Canada, 1955*, Health Care Series No. 6, pp. 143, Department of National Health and Welfare, Ottawa, May, 1957.

This bulletin has been issued as an interim report in anticipation of the publication of a revised and extended study on voluntary health insurance in Canada. In tabular form, on a provincial and national basis, it presents statistical information made available by both hospital and medical care insurance plans on their enrolment and financial experience for the year 1955.

S. Mushkin, "Age Differential in Medical Spending," *Public Health Reports*, vol. 72, p. 115, February 1957, and "Characteristics of Large Medical Expenses," *ibid.*, p. 697, August 1957.

Using a random sample of the interviews in the Survey of Consumer Expenditures in 1950,[1] the Public Health Service has undertaken a special study of consumer expenditures for medical care. The study will be directed to (*a*) the composition and characteristics of the larger medical care bills, (*b*) the types of free medical services received by individuals in different economic circumstances, and (*c*) the variations in spending for medical care among different age groups. The earlier paper is concerned with the last of these. The average out-of-pocket medical care expenditures per person in the urban population of 1950 are compared according to age. Within each broad age group, there is shown the distribution of persons and of medical care expenditures according to amount of medical care expenditures. The second paper has an estimate that only 1.3 percent of urban families have annual out-of-pocket medical care expenditures of $1,000 or more; this includes premiums paid for voluntary health insurance but excludes the value of any benefits received. Distributions of all urban families and of families with annual out-of-pocket medical care expenditures of $1,000 or more are compared according to types of services and income class. The report states that "prepayment for medical care expense may be expected to change the shape of the distribution curve of medical expense. The percentage of families with large medical expense, for example, should be lower today than prior to the growth of voluntary health insurance. Voluntary health insurance premiums, on the one hand, and benefits provided, on the other, should have evened out the distribution of medical spending and reduced the incidence of the large medical bill." The report points out further that "costs of medical care for some types of illnesses are lower today than 25 years ago because of changes in the incidence and severity of these illnesses and changes in the methods of treatment. . . . However, improved medical procedures and therapies make for higher costs of care for other major illnesses. . . ."

M. E. Odoroff and L. M. Abbe, "Use of General Hospitals: Demographic and Ecologic Factors," *Public Health Reports*, vol. 72, p. 397, May 1957.

A sample of the civilian noninstitutional population within the continental United States was surveyed in September 1956 with regard to the history of hospitalization and outpatient care received during the previous twelve month period. Questions were asked to ascertain how frequently, how long, for what conditions and in what hospitals

[1] See *TSA* VIII, 650.

or related facilities such care was received. Data were secured with regard to personal characteristics, such as residence, sex, race, age, veteran status and occupation. The study is intended as a first step in defining standards of need for general hospital beds. The present article is preliminary to a larger report. Rates are presented of general population use by sex and race, by age, by veteran status, by employment status and industry, by region, separately for rural and urban areas, by median distance traveled from residence to place of care, and by reason for admission according to place of care.

Study of Consumer Expenditures, Incomes and Savings: Vol. XVI, Detailed Family Expenditures for Medical Care, Personal Care, Recreation, Transportation and Miscellaneous Services, pp. xlvi, 82, University of Pennsylvania, 1957.

This report is based upon data collected in the survey of consumer expenditures in 1950, conducted by the U.S. Bureau of Labor Statistics. The tabulations were prepared in cooperation with the Wharton School of Finance and Commerce under a grant from the Ford Foundation (see *TSA* VIII, 650 for a digest of Vol. VIII of this series). The present volume shows average family expenditures and percentage of families recording purchases of specific medical care items in 91 representative cities. The medical care expenditure items include fees and premiums for medical care group plans and insurance and for disability, health and accident insurance. Also shown are expenses while hospitalized, which include room or ward, physician, specialist and surgical services, nursing services, other charges and ambulance services, but exclude expenses covered by group plans or insurance. Other medical care expenses include physician, specialist, and surgical services, dental care, chiropractor, oculist, optometrist, eyeglasses, laboratory tests, nursing at home, drugs and medicines, appliances and supplies, again apart from those covered by group plans or insurance. Average family expenditures and percentage of families reporting medical care items are presented according to net annual money income class, separately for large cities, suburbs and small cities in the North, South and West. These geographic data are shown for each of the detailed medical expenditure items previously mentioned.

**Health and Medical Care in New York City: A Report by the Committee for the Special Research Project in the Health Insurance Plan of Greater New York*, pp. ix, 275, published for the Commonwealth Fund by Harvard University Press, Cambridge, Mass., 1957.

This project, the cost of which was jointly financed by the Commonwealth Fund and the Rockefeller Foundation, was designed to study the need for medical care and the volume and kind of medical service utilized by persons covered by the Health Insurance Plan as compared with the general population of New York City. It includes an inquiry into the extent to which the population is covered for hospitalization and medical care by one or more insurance plans as well as a comparative study of the demographic and social characteristics among the New York City, H.I.P. and other insurance plan populations. In addition, as a by-product, it was expected that the project would contribute to the methodology of morbidity surveys and of longitudinal observation and also to the analysis of health conditions and disease in general and of the use of curative and preventive medical services.

The basic data for the report were obtained by a Household Survey conducted during March–June of 1952. For the H.I.P. sample one member was interviewed of each of 3,235 households containing 10,981 persons, of whom 8,040 had H.I.P. coverage. The New York City sample involved 4,190 households and 13,358 persons. Questions were asked relating to illness the day before interview, to illness during the last eight weeks and to illness during the calendar year 1951.

The chapters discussing the findings deal with demographic characteristics and insurance status of the samples, contacts with physicians and existence of family physicians, pediatric services, persons with medical conditions and medical care therefor, morbidity, disability and medical care related to specific illness conditions, hospitalization, dental care and preventive health services. The appendixes describe the schedules used in the Household Survey, the sampling design, the methodology, and the detailed statistical tables on file which were summarized in this report; there is also a comparison of the data obtained for this report with those from other sources.

H. le Riche, *A Sample Study on the Participants of a Canadian Pre-Payment Medical Care Plan in Regard to Costs, Disease Episodes and Services*, pp. vi, 168, Physicians' Services, Incorporated, Toronto, Ont., 1957.

Physicians' Services, Incorporated, is a prepaid, nonprofit medical care plan sponsored by the Ontario Medical Association in operation since 1947 and covering about 700,000 persons. Individual coverage is not provided at present. A comprehensive contract covers medical, surgical and obstetrical services in the office, home and hospital. One limited contract covers such services in the hospital only, and another is restricted to surgical and obstetrical services. This study, based upon a 2% sample of the 1954 experience, contains a detailed analysis of costs, services and sickness episodes for principal disease categories. The costs represent the amount of money available to physicians, which approximates 90% of a fee schedule.

London Transport Executive, *Health in Industry: A Contribution to the Study of Sickness Absence*, pp. 177, Butterworth & Company, Ltd., London, 1956.

An account is given by F. H. Spratling, F.I.A., of the principles and methods followed in the compilation of sickness-absence statistics of London Transport employees. The preface, by Dr. L. G. Norman and Mr. Spratling, states that "... our first objective must be to build from the experience of our own organization tables which could be used as standards of measurements in the further study of sickness absence." An extensive body of data is presented on the experience of bus drivers and male conductors, motormen and guards, male workshop staff and clerical and technical staff.

Social Security

Department of Health, Education, and Welfare, *Basic Readings in Social Security, Social Welfare—Social Insurance*, pp. vi, 144, Social Security Administration, Washington, 1957.

This bibliography serves as a guide to significant books, pamphlets, and articles dealing with the programs administered under the Social Security Act. Included are items of historical interest as well as those of current value. Separate listings are given for such broad topics as public assistance and OASI, with major subdivisions of the latter, such as OASI Benefits and Beneficiaries, OASI Coverage, and OASI Financing.

R. J. Myers, "Old-Age, Survivors, and Disability Insurance Provisions: Summary of Legislation, 1935–56," *Social Security Bulletin*, July 1957.

The principle feature of this article is a useful chart summarizing each of the various major provisions of the OASDI system as they existed in the initial 1935 legislation and as they were modified or added by each of the subsequent amendments.

*International Social Security Association, "Social Security Legislation in the United States," *Bulletin*, March–April 1957.

This entire issue is devoted to six articles on various aspects of social security in the United States. Two of these articles deal with the general philosophy of the social security programs in the United States, stressing the dynamic characteristics. The first by Professor and Mrs. Somers also brings out the many similarities between the American and European systems, which are not widely recognized abroad.[1] The second one, by Dean Brown—a reproduction of a paper in *Social Service Review* for March 1956—emphasizes the following philosophical features of the United States programs (both actual and desired): benefits as a right, universal coverage, wage-related benefits, protection of the family against all hazards, and joint employer-employee contributions. Two other papers analyze the 1956 amendments to the Social Security Act, both as to the new provisions and also as to the provisions of the OASDI system as it then existed, with special emphasis upon the financing aspects. Another article summarizes major workmen's compensation legislation in 1956. The final article dealing with social welfare expenditures in 1954–55—reprinted from the *Social Security Bulletin* for October 1956—points out that, although dollarwise such expenditures have increased substantially, currently they amount to less than 9% of our national output and that with increasing productivity it is probable that this proportion will rise in the future.

T. N. E. Greville and J. A. Lazerson, "Present Values of OASI Benefits in Current Payment Status, 1940–56," *Actuarial Study No. 45*, pp. 21, Social Security Administration, May 1957.

This study extends to 1956 the analysis previously made (see *Actuarial Study No. 42*) as to the present value of OASI benefits currently being paid. This is only part of the total liabilities of the system, although the most precisely definable and easily measured. Based on a $2\frac{1}{2}$% interest rate and current population mortality, such present value amounted to \$$48\frac{1}{2}$ billion at the end of 1956, or somewhat more than twice as much as the \$$22\frac{1}{2}$ billion in the trust fund. This situation—the present value exceeding the trust fund—has existed ever since 1952. The report states that this situation "does not indicate that the system is insolvent, as would be the case in a private insurance system, but shows that at present the financing of the system is much closer to a pay-as-you-go basis than to a fully funded basis."

*T. N. E. Greville, "Illustrative United States Population Projections," *Actuarial Study No. 46*, pp. 53, Social Security Administration, May 1957.

Projected populations are shown for every fifth year from 1955 to 2050 for 5-year age groups by sex on the basis of four different combinations of assumptions as to future mortality, fertility, and net migration, and for both sexes combined on two further sets of assumptions involving continuation of, approximately, the present high fertility rates over the next century. The population projected includes Alaska, Hawaii, Puerto Rico, and the Virgin Islands, as well as armed forces overseas. Details concerning the method of projection are described.

P. I. Robinson, "Medicare: Uniformed Services Program for Dependents," *Social Security Bulletin*, July 1957.

This article summarizes the new program for orderly provision of medical care for dependents of those in the Uniformed Services. In addition to possible treatment and

[1] See page 472 for a further discussion of this article.

hospitalization in service facilities when space is available, there is now a set of definite provisions for hospitalization, surgical and in-hospital care, and certain out-patient services. Full hospitalization costs, except for a small deductible, are paid for semiprivate accommodations. Private duty nursing costs are reimbursable after a $100 deductible and with 25% coinsurance. Full surgical costs are provided, with allowances to physicians according to fixed fee schedules (as maximum payments) varying by state—arrived at by negotiations with state medical societies. Payments to hospitals are made through Blue Cross plans in some states and through an insurance company in other states. Payments to physicians are made through fiscal agents appointed by each of the state medical societies; this agent is usually a Blue Shield plan, although in some states it is the medical society itself and in other states an insurance company. A small amount of data is given in regard to the first 5 months' operations.

Other Topics

*E. W. Patterson, *Essentials of Insurance Law*, Second Edition, pp. xiv, 558, McGraw-Hill Book Company, Inc., New York, 1957.

This treatise on the law of insurance has special significance because of the eminence of Professor Patterson, Cardoza Professor of Jurisprudence at Columbia University, former Deputy Superintendent of Insurance of New York, and participant in the 1939 revision of the New York Insurance Law. Among its features is a comprehensive discussion of the legal principles affecting the life insurance contract. The first edition appeared in 1935.

F. C. Madigan, S.J., "Are Sex Mortality Differentials Biologically Caused?" *Milbank Memorial Fund Quarterly*, vol. 35, p. 202, April 1957.

The study is based on the mortality experienced between 1900 and 1954 by teachers and personnel of administrative staffs of Roman Catholic religious Brotherhoods and Sisterhoods engaged in educational work. Both categories were presumably living in the same social and cultural environment. The data appear to indicate that biological factors are much more important than cultural stresses in producing the sex differential in mortality.

"Tables of Working Life for Women, 1950," Bulletin No. 1204, Bureau of Labor Statistics, U.S. Department of Labor, Washington, 1957.

This study, prepared by S. H. Garfinkle, is similar to the previously developed "Tables of Working Life: Length of Working Life for Men," Bureau of Labor Statistics Bulletin No. 1001, published in 1950. The basic data are from the 1950 census of population and the United States Life Tables, 1949–51. From these were first prepared a table for a stationary female population distributed according to marital status and presence of children and then a corresponding table for females in the labor force. Derived from these are age-specific rates of accessions to and separations from the female labor force, average number of years of work remaining, and average number of years in retirement. The methods of deriving these tables are described in a technical appendix.

P. H. Jacobson, "An Estimate of the Expectation of Life in the United States in 1850," *Milbank Memorial Fund Quarterly*, vol. 35, p. 197, April 1957.

Since records of mortality in the United States for the 19th century are very limited, data for Massachusetts have often been used to describe the experience of that period.

By averaging available mortality data for Maryland and Massachusetts, the author has constructed a life table to approximate the nationwide experience in 1850. The resulting values of q_x, l_x, and $\mathring{e}_x$ for white males and females are shown for the first five years of life and for quinquennial ages to 85. The expectation of life at birth was 40.4 years for males and 43.0 years for females. The data also indicate that from age 10 through most of the childbearing period, the mortality rate for females exceeded that for males. However, the expectation of life in the United States was not unlike that in much of Western Europe, judged by data for eight foreign countries.

Highlights of Research Progress, National Institutes of Health, 1956, pp. 172, Office of Research Information, National Institutes of Health, U.S. Department of Health, Education, and Welfare, Washington, D.C.

The subtitle of this report is "Items of Interest on Program Developments and Research. Studies Conducted and Supported by the Institutes and Divisions of NIH as Presented to the Congress of the United States." The reports of most of the 11 Institutes and Divisions state that they were prepared in January 1957.

Among the progress reports for 1956 covering research on the diagnosis of cancer is the development of a test that may be useful as a screening procedure for the detection of early uterine cancer, of a test that may be useful in evaluating the accuracy of diagnosis of abdominal and thoracic tumors, and of a simplified tubeless gastric analysis technique for the early detection of gastric cancer.

Included among the items reported on heart progress is an observation that "Men between 45 and 62 years of age with any two of these three conditions—hypertension, overweight, and high blood cholesterol—are about nine times as likely to develop coronary heart disease as men with none of these conditions." Another report stated that Rauwolfia therapy produced definite improvements in a group of coronary patients as evidenced by a general decrease in the frequency and severity of their attacks and an increased ability to exercise without pain; in some instances, there was a protracted duration of these beneficial effects. Some results are described with a new orally administered ganglion-blocking drug, that is, one of a category that interferes with the transmission of artery constricting impulses in nerve centers and thereby lowers blood pressure.

Studies at the University of Michigan indicate that cortisone, when used with a glucose tolerance test, may be useful as an aid in revealing latent diabetes in people with a family history of the disease.

P. C. Glick, *American Families*, pp. xiv, 240, John Wiley & Sons, Inc., New York, 1957.

This is a volume in a series of census monographs prepared for the Social Science Research Council in cooperation with the Bureau of the Census. The author presents a demographic description of American families, based largely on data from the decennial censuses and the annual sample surveys conducted by the Bureau of the Census since 1944. Chapters deal with family living arrangements, and with household and family composition. The life cycle of families is described, with emphasis on the changes in their composition and of their social and economic characteristics. A chapter on first marriages and remarriages considers the upward trend in marriage, factors related to age at marriage, and differences between ages of husband and wife. Further chapters are concerned with rates of marriage, separation, divorce, and widowhood; others include household, family, and marriage projections. A bibliography lists separately books, articles and pamphlets, and public documents pertinent to the volume. Appendixes contain census sources and definitions, a discussion of the comparability and reliability of census family data, and a technical note on projections.

R. G. Canning, *Electronic Data Processing for Business and Industry*, pp. xi, 332, John Wiley & Sons, Inc., New York, 1956.

This text provides an introduction to the application of electronic data processing methods to business and industry for those who have no direct association with the subject. Computers currently in use are not discussed in the book. The first part of the book provides some of the principles of electronic data processing; the second discusses the application of these principles to an individual problem; and the third discusses steps which the systems engineer (person in charge of a study) should take in the study of available equipment, in the assurance that all components of a proposed system will tie together properly, and in the development of plans for an integrated system.

*D. U. Greenwald, *Linear Programming—An Explanation of the Simplex Algorithm*, pp. vii, 75, Ronald Press, New York, 1957.

Assuming only a knowledge of elementary algebra, this book tells how to formulate and solve linear programming problems. The exposition is largely by working through and discussing a number of problems. No proof of the method of solution used is presented, but several exercise problems are included.

J. L. Pennock and C. M. Jaeger, "Estimating the Service Life of Household Goods by Actuarial Methods," *Journal of the American Statistical Association*, vol. 52, no. 278, p. 175, 1957.

This methodological article indicates how the service life expectancy of durable household goods can be estimated from data obtained in a single survey. This is defined as the average service life in a single household, regardless of whether the article is discarded or replaced because it is worn out, or because the family's needs or preferences have changed or the article is outmoded. Estimates now available are based on opinion rather than fact, and are frequently generalizations on the personal experience of manufacturers, salesmen, servicemen, fire insurance adjusters and others familiar with the household goods and their performance. Such estimates show considerable divergence.

The technique described and illustrated here is based on computing age-specific removal rates, and is analogous to the census method for constructing mortality tables. Possible pitfalls in the interpretation of the results are pointed out.