BOOK REVIEWS AND NOTICES*

Report of the Committee on the Economic and Financial Problems of the Provision for Old Age, presented by the Chancellor of the Exchequer to Parliament by Command of Her Majesty, December, 1954, pp. iii, 120, H.M. Stationery Office, London.

In Great Britain there has been a growing awareness and concern that the nation is involved in rapidly growing financial and other commitments to its elderly population. Even at current rates of benefit, expenditures for governmentally provided "national" old age and retirement pensions are expected to double over the next 25 years, while those for the so-called "occupational" pensions (private and nationalized industries and public services) are unlikely to grow less rapidly. The reason is to be found, not only in a prospective heavy increase in the numbers of the aged, both absolute and relative to the total or the active population, but also in large concurrent increases in the numbers becoming eligible for pension under existing legislation and in the pension rights acquired under private plans. The problem is further magnified by the virtual certainty of substantial increases in the pension rates. It was with such a prospect in view that a special ten-person statutory committee, under the chairmanship of Sir Thomas Phillips, was appointed in July 1953, with the following terms of reference:

To review the economic and financial problems involved in providing for old age, having regard to the prospective increase in the numbers of the aged, and to make recommendations.

The committee's Report, made public last December, is a comprehensive and thoroughgoing attempt to meet this assignment. It does an outstanding job in marshaling, digesting and interpreting the available evidence and formulating recommendations with a high degree of realism, perspective and unanimity. The estimated cost of preparing and publishing it, we are told, was a little over £2000.

With reference to the part played by the actuarial profession in the development of the Report, it is noteworthy that the membership of the committee included three fellows of the British Institute (Messrs. Gunlake, Honey and Menzler). Also acknowledgment is made of the role of the Government Actuary (Sir George Maddex) in providing memoranda (one relating to Population Trends in Great Britain appears as Appendix II) and oral evidence. Further indebtedness is expressed to "the members of the actuarial profession who cooperated in the special enquiry into the statistics of privately administered pension funds undertaken on our behalf by the Institute of Actuaries and by the Faculty of Actuaries in Scotland."

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

The Report is well summarized in a concluding 8-page section (VII). The entire Report is confidently recommended as a valuable contribution to actuarial education in this country. The ensuing remarks will be confined to some general observations.

It takes only a cursory look at the situation in the U.S.A. to realize the many striking similarities between the problems of providing for the aged in the two countries. We too have a rapidly aging population, and are committed to an outlay for national contributory pensions that will perhaps triple (rather than double) in the next 25 years, and to financing a phenomenal expansion in the area of private pensions. It is not, therefore, at all unlikely that the sort of solution contemplated by the Phillips study also has significance for us, and that the type of research which undoubtedly has elucidated the situation for the British will also throw light on our problems, both by way of defining them and confirming or modifying contemplated solutions or evolving new ones.

The reader's attention is particularly directed to the masterly discussion in Section III of the "Main Economic and Financial Problems"—problems which in essence confront us no less than the British. What, broadly, are these problems? Adapting the language of the Report, we find:

1. The economic problem relates to "the need to accumulate or free resources out of which adequate provision can be made for the old"; to "finding room, amid all the other claims on the nation's resources, for what is due from the generation still at work to the generation that has passed working age."
2. The financial problem arises out of the need to transfer, from one source or another, to those old persons (the great majority) who have found it impossible to provide themselves through voluntary or required savings with a return adequate to their needs, the purchasing power that will give them the appropriate command over the available resources.

To state these problems, incidentally, is to realize the basic solidarity of the generations, economically and financially as well as socially and spiritually, despite an all too common tendency to try to hold them apart and in isolation. The reader will find much in the Report to substantiate this view, in the treatment of National Insurance and occupational pensions no less than in that of National Assistance and other services.

Whether, as in Britain, it is expected that the bulk of the future heavy increase in the "burden" of compulsory pensions will be a direct charge on the Exchequer, or, as in this country, that the increase will be absorbed mainly in the scheduled employer-employee contributions, the ultimate source will in each case be the wealth produced by the nation's workers. Thus the problem of dealing with the "burden" of old age is to a large extent the problem of having the requisite wealth (income) available to be tapped. A major requirement for producing wealth is, of course, the creation of real capital assets, which therefore, as the Report clearly brings out, is crucial for meeting the "burden" of old age.

Under private plans the necessary capital assets are created by the investment of contribution income not currently needed for pension payments. The

money is loaned to persons seeking to build assets from which to derive future income, including that needed to supplement current contributions in discharging the pension obligations.

Under a national pension plan, where, because of the state's power to tax and to require contributions, accumulation of a fund large enough to fulfill this purpose is not necessary, and for a variety of reasons is not desirable, there is no direct creation of capital assets through the investment of funds not currently needed to pay pensions. Consequently, other means must be sought for assuring the future availability of assets in volume sufficient to support the pensions then falling due, as well as the multitude of other claims on the national income. If this is not done, the generation which legislates pension obligations today may simply be counting on its successors of tomorrow to honor those obligations without having done anything to facilitate their task for them. These successor generations will hardly be to blame if they find the "burden" an impossible one, to be repudiated either directly or by the inflationary route.

Thus we too, like the Phillips Committee, may well find "two major issues" emerging from our analysis:

(a) What can or should this generation do to ease the task of the next in providing for the elderly?

(b) What can a future generation afford to do for the elderly out of its own resources without undue strain?

This in turn suggests such further broad questions as:

1. What is our capacity as a nation for creating capital assets—an important factor in our potential productivity—and to what extent should we count on the actual development of that capacity?

2. In view of the manifold demands on our future productivity besides those for the support and welfare of the elderly—for defense, education, etc.— what priorities are to be assigned the various claims, and just how should our aspirations in regard to the welfare of the aged, and pensions in particular, be circumscribed?

Clearly there is here an occasion for research calling for the best at our command in talent, effort and cooperation from relevant sources of information. While there have been many studies of social security and related subjects, both governmental and private, in this country, these have been largely preoccupied with current issues such as the recasting of legislation. The time seems ripe for a study focused primarily on the long-range consequences for the American economy of the various kinds of retirement provision.

G. W. K. GRANGE

*National Insurance Act, 1946, Report by the Government Actuary on the First Quinquennial Review, pp. iii, 60, H.M. Stationery Office, London, November 30, 1954.

The British National Insurance Act of 1946 was the culmination of the studies and report made by Lord Beveridge, and the broad and virtually uni-

versal social insurance system arising therefrom became effective in July 1948. Following the inception of the program, four annual interim actuarial reviews have been prepared, but a more complete review is required by the law at quin-quennial intervals, the first one covering a period of approximately $5\frac{3}{4}$ years (up through the fiscal year ending in March 1954). The present thorough report not only takes into account the several important amendments made in the interval (though naturally not those made in late 1954), but also re-examines the basic actuarial assumptions and then develops new long-range cost esti-mates.

With its wealth of information, the report is virtually a self-contained docu-ment. The present system established by the National Insurance Act (providing benefits for retirement, survivorship, unemployment, sickness, and maternity) and the important changes made during the period are described briefly to supplement the major purpose of the report, namely, the presentation of the actuarial cost analysis and estimates. Included also is a very clear description of the fundamental financing principles of the long-range benefits. Medical care, children's allowances, national assistance, and workmen's compensation (in-dustrial injuries) provided under separate legislation are not treated in this report.

The program established by the National Insurance Act covers the entire population except children of school age and younger and except certain groups who may elect not to be covered (married women, persons with very low in-comes, etc.). Unemployment benefits are available only to employees, weekly sickness and maternity benefits only to employees and self-employed persons, and the other benefits (retirement, survivorship, and maternity and death lump-sums) to the entire insured population. The basic rate of weekly benefit is $32\frac{1}{2}s$. (a shilling is worth approximately 14 cents); there is an addition of $21\frac{1}{2}s$. for a dependent wife and $10\frac{1}{2}s$. for each dependent child (including the children's allowance benefit of $8s$. for each child after the first).[1] A married woman may receive the full basic $32\frac{1}{2}s$. retirement benefit if she is insured, rather than the lower wife's benefit. Married women receive lower benefits for unemployment ($26s$.) and for sickness ($22s$.).[1]

Retirement pensions are payable at age 65 for men and age 60 for women, with the additional benefit for the wife, in essence, payable regardless of her age. In addition there is an increment for deferred retirement ($1\frac{1}{2}s$. added to the basic amount for each half year of deferment, plus a corresponding $1s$. added to the wife's benefit); in any event benefits are automatically payable 5 years after the minimum age (corresponding to age 72 in the United States system). The widow's benefit is at the full basic rate, with no increments. All widows receive a benefit of $42\frac{1}{2}s$. for the first 13 weeks of widowhood.[1] Then the basic widow's benefit plus benefits for children are payable while the widow has dependent children (until the July 31 following the youngest child's attainment of age 16,

[1] The 1954 Act changed these rates as follows: basic rate, $40s$.; dependent wife, $25s$.; dependent child, $11\frac{1}{2}s$.; married woman for unemployment and sickness, $30s$. and $25s$. respectively; widow for first 13 weeks, $55s$.

if he is in school); when children are no longer eligible, the widow's benefit continues only if she is then age 40 or over, or disabled. After the first 13 weeks of widowhood, a childless widow receives benefits only if she is age 50 or over at widowhood, or disabled. After age 60, widow's benefits are classified as retirement benefits. All retirement and survivor benefits are payable subject to an earnings test; the first 40s. a week of earnings (60s. for widows with children) are exempt, and thereafter a "one-for-one" reduction occurs.

The financing basis is rather complex. For each category by type of employment and sex, a so-called "actuarial contribution" is determined which in essence is a level-premium, new entrant (at the minimum age for coverage) cost on the basis of a given rate of interest, 3% (even though the system is financed more or less on a pay-as-you-go basis). The total contribution rate payable is in actual practice an approximation of the actuarial rate.[2] Most of the contribution is paid by the insured persons and their employers, the general Treasury paying the remainder. In addition, the general Treasury meets the remaining liabilities of the system, or in other words what might be termed all the prior service charges (including the increased cost of any liberalizations in benefits that occur from time to time that are not met by the resulting increased actuarial contributions). The latter costs are met by the general Treasury as deficiencies of income against outgo emerge in the future, rather than on a level or advanced basis, so that in essence the system will not be funded but will be on a more or less pay-as-you-go basis.

At first glance, it may seem improper to make actuarial calculations using any interest rate because the system is, at best, only slightly funded (and no future growth in the fund is anticipated). Actually, in the opinion of this reviewer, this procedure is quite proper because, in effect, the gradually emerging costs borne by the general Treasury represent, in part, interest payments on monies "borrowed" from the contributors in the early years. These monies would not have had to be borrowed if the general Treasury costs had been met on a level or advance funding basis. Accordingly, interest is properly a part of the picture. Moreover, it is reasonable to compute the new entrant cost on an interest basis because, if the system did not exist, the new entrant could invest his contributions and earn interest on them.

The actuarial contribution rate is, of course, determined by considering the various types of benefits payable, although it is collected as a unit so that the insured individuals do not readily know the breakdown. For employed men, 52% of the actuarial contribution is for retirement benefits (including widow's benefits at age 60 and over), 6% for survivor benefits, 16% for unemployment benefits, 20% for sickness and maternity benefits, and 6% for administration. For employed women, the actuarial contribution rate consists of 54% for retirement benefits, 12% for unemployment benefits, 17% for sickness benefits,

² Under the 1954 Act, there is a new concept—the contribution rate charged is made up of the actuarial contribution plus an addition toward the increased cost arising for raising the pensions of those currently in the system (who will not contribute for a working lifetime at the new higher actuarial contribution rate).

10% for maternity benefits, 1% for survivor benefits, and 6% for administrative expenses.

As to current contribution rates, an insured adult male employee pays a total of $5\frac{3}{4}s$. a week and his employer pays $5s$.[3] From this, $\frac{3}{4}s$. is deducted for workmen's compensation and slightly more than $\frac{3}{4}s$. as a partial contribution to the National Health Service, and $1\frac{1}{2}s$. is added as the Government contribution, making a total contribution of $10\frac{2}{3}s$. Employed adult women have a contribution rate roughly 20% lower. Correspondingly, for self-employed persons the contribution rate is about 25% lower, while for nonemployed persons it is roughly 50% lower than for employees—these differentials, of course, reflecting in large part the absence of certain types of protection.

Quite naturally, current contribution rates are not exactly the same as the newly developed actuarial contribution rates. While in some cases (for employees) the total contribution *including* the Government share is more than the computed rate, in no instance is the total contribution *excluding* the Government share more than the computed rate. Taking all classes of insured persons together, the new estimates indicate that the current contribution rates including the Government share are about $\frac{1}{2}s$. higher than needed under the concept of charging only the new entrant rate (a relative excess of about 5%). Of course, such excess can be well utilized toward meeting part of the emerging deficiency shouldered *entirely* by the general Treasury.

The system started operation in 1948 with a balance of about £900 million (a pound is worth approximately $2.80), representing the transferred assets of the previously existing limited contributory plan. In each of the six fiscal years to date, despite liberalizations in the benefits, which in one instance was accompanied by increases in contributions, income has exceeded expenditure, and the balance in the fund grew to £1.4 billion at the end of the period. Over the $5\frac{3}{4}$-year period, contribution income amounted to £2.2 billion, payments from the general Treasury to £600 million, and interest to £200 million. At the same time, unemployment benefits amounted to about £100 million, sickness benefits to £400 million, maternity benefits to £50 million, survivor benefits to £150 million, and retirement benefits to £1.6 billion. Total income of £3.0 billion thus exceeded total outgo of £2.5 billion (including about £140 million for administrative expenses) by £500 million.

Originally it had been anticipated that income and outgo would be more or less in balance over the near-future years. The actual excess income resulted from a number of factors, principally appreciably lower unemployment than estimated and somewhat lower sickness rates, while at the same time contribution income was somewhat larger because of higher employment. On the other hand, retirement costs were somewhat higher than originally estimated. The average unemployment rate originally assumed, on the basis of Government instructions, was $8\frac{1}{2}$%, but this was subsequently reduced to 4% (the average rate has been about $1\frac{1}{2}$%).

[3] Under the 1954 Act, these rates are each increased by $1s$.

Future cost estimates are presented not only on the basis of the new entrant level-premium cost, but also showing year-by-year projections of cost over the next 25 years. Unlike the practice in the United States, a single projection of cost is made although a range projection is presented for the basic population estimates, indicating the considerable spread that may result depending upon the assumptions made. This reviewer believes that it would be very interesting and informative to see the British cost estimates likewise on a range basis. In this connection it should be noted that, for a given variation in the total benefit expenditures, a relatively much greater variation will occur in the emerging payments from the general Treasury, which are residual, balancing items.

Over the next 25 years the number of contributors will remain relatively constant at about $23\frac{1}{2}$ to 24 million. The present $23\frac{1}{2}$ million contributors are subdivided by type of employment into 21.5 million employees (of whom 2.2 million do not contribute although their employer does—primarily married women who have elected to stay out of the system, with the remainder being retired persons who have returned to employment), 1.4 million self-employed, and .6 million nonemployed contributors. The covered population by sex consists of 16.1 million men and 7.4 million women (3.1 million married, of whom 1.8 million have elected not to contribute themselves).

In 1954 there were 4.3 million retirement beneficiaries (plus about 100,000 wives under age 60 for whom the husband was receiving an additional benefit). In 25 years this total is expected to increase by about 75% to 7.6 million. The retirement pensioners in 1954 represented about 63% of the total aged population (men 65 and over and women 60 and over), while 25 years hence this proportion will rise to 80%. The present gap of about 37% represents in part the failure to cover all the current aged and in part the effect of the retirement test. In the distant future, the latter factor, of course, will be the only important one. Widow beneficiaries under age 60 now number about 450,000, and it is anticipated that this group will increase slowly to perhaps 500,000 and then decline.

Total annual expenditures for benefits are currently running about £500 million, subdivided into £350 million for retirement benefits, £35 million for survivor benefits, £20 million for unemployment benefits, and £100 million for sickness and maternity benefits. For the future the expected trend for survivor benefits and for sickness and maternity benefits is relatively level. Unemployment benefits are estimated to triple (because of the assumption of an unemployment rate of about 4% as against the present level of about $1\frac{1}{2}$%). Retirement benefits are estimated to increase steadily, until in 25 years the annual rate of disbursements will be £665 million, or almost twice as large as at present. Accordingly, total benefit expenditures 25 years hence are estimated at £885 million, or a 75% increase over the present level.

Since the number of contributors is estimated to be relatively level over the next 25 years, the contribution income from insured persons and employers likewise is estimated to be relatively level, at about £440 million a year. To this amount is added the Government contribution of about £70 million a year.

Interest income annually on the existing £1.4 billion fund is shown at £45 million a year so that the total income of the system from the preceding sources is roughly £550 million a year. For the first two years, income will slightly exceed outgo, but thereafter an increasing deficiency will occur, amounting to about £350 million 25 years hence, and ultimately to about £400 million. This deficiency, as mentioned previously, will be met by the general Treasury.

Still another type of actuarial analysis made is the determination of the accrued liability as of the present time, on the basis of an interest rate of 3%. This accrued liability is £11 billion, based on the excess of the present value of future benefits to present active and retired individuals over the present value of the worker, employer, and Government contributions involved in the actuarial contribution rate basis. Only £1.4 billion of this £11 billion accrued liability is funded and, accordingly, the remainder must, over the future, be met by the payments from the general Treasury as the annual deficiencies emerge. The £11 billion accrued liability is subdivided into £3 billion for presently retired persons and £8 billion for existing contributors.

A further interesting point brought out is in connection with the increase in the accrued liability as a result of the benefit liberalizations made in 1951 and 1952. The former resulted in an increase of £2 billion, while for the latter the corresponding figure was £3 billion, although, as an offset, the increased contributions provided at the same time had a present value of about £2 billion.

Several interesting appendixes make up the last half of the report. The methodology and assumptions made for the population projections and the cost estimates are given. Several interesting points as to the assumptions may be cited. Over the next 25 years, a very considerable improvement in mortality is assumed (arrived at by extrapolating by geometrical progression the decline in the first half of this century); where the projections are carried out beyond this period, constant rates are assumed. The decline in the 25-year period is estimated at as much as 50% for the youngest ages, decreasing for men to about 20% in the 60's and about 5% in the 80's (for women somewhat more of a decrease is shown). As to fertility rates, a small decline from the present level is allowed for in the future. It is interesting to note that the trend of births in Great Britain has been considerably different from that in the United States. Considering total annual births, the number in Britain declined from 1.0 million in 1947 to about 770,000 in recent years, while in the United States the 1947 peak of 3.8 million was equaled in 1951 and exceeded in each subsequent year, with the 1954 figure being 4.1 million.

For purposes of the cost estimates, differentials in mortality rates according to marital status are used. Married men aged 20–24 are assumed to have 40% lower mortality than all men in this age group; this differential rapidly diminishes until for ages 45–74 it is only about 5%, but thereafter increases to somewhat more than 10% for ages 85 and over. The mortality of widows is taken to be about 100% higher than that of all women at the younger ages, with this differential rapidly decreasing to about 25% for ages 35–39, about 10% for ages 55–59, and about 5% for ages 70 and over. Other demographic data presented

are relative ages of husbands and wives, proportions of widows with children, age distribution of children according to age of newly widowed mothers, remarriage rates, average weeks of sickness according to age and marital status, and proportions of male beneficiaries with adult and child dependents.

ROBERT J. MYERS

Commission on the Financing of Hospital Care, *Financing Hospital Care in the United States:* Volume 1, *Factors Affecting the Costs of Hospital Care,* pp. xvii, 300; Volume 2, *Prepayment and the Community,* pp. xxiii, 356; Volume 3, *Financing Hospital Care for Non-Wage and Low-Income Groups,* pp. xviii, 110; McGraw-Hill Book Company, Inc., New York, 1954.

These three volumes give in detail the results of the studies of the Commission on the Financing of Hospital Care which were completed in 1954. The recommendations they contain had previously been summarized and were published early in 1954 as the *Recommendations of the Commission on the Financing of Hospital Care.*

The Commission was established in 1951 to make a twofold investigation into the costs of providing adequate hospital services and the best systems of prepayment for such services. The 34 members of the Commission included persons representing various points of view and fields of interest, several individuals with insurance company backgrounds being among them. The funds for the work of the Commission were made available by the Blue Cross Commission of the American Hospital Association, the Health Information Foundation, John Hancock Mutual Life Insurance Company, W. K. Kellogg Foundation, Michigan Medical Service, Milbank Memorial Foundation, National Foundation for Infantile Paralysis, and Rockefeller Foundation.

The Commission divided its work into three general areas, namely the study of hospital costs, the study of prepayment, and the problem of taking care of the nonwage and low-income groups. A committee of the Commission consisting of one-third of the members was established for each subdivision to be assisted by staff personnel and a group of consultants. Each of the three volumes constitutes the report of the work of one of the committees. The subdivision of the field of study resulted in a certain amount of duplication in the matters considered by the three committees and in the scope of their conclusions.

The recommendations of the Commission, which as mentioned above were published separately before they appeared in these volumes, constituted a relatively brief document whose scope and statement was deliberated carefully and at length by the entire Commission. The recommendations were accepted by the Commission with but one or two expressed disagreements, and so can properly be described as the consensus of the Commission as a whole. This is not so in the case of the detailed reports of the three committees, which partly because of the limitations of time were not given the same careful consideration by the Commission. These reports rest heavily on drafting by the staff and, particularly in the case of Volumes 2 and 3, they evidence a coloration which they probably

would not have had if they had been discussed in detail by the Commission as a whole.

The report of the Fiscal Studies Committee in Volume 1 analyzes such things as the growth and changing role of hospitals in this country, the rise in their operating expenses, the changing sources of their income, and the extent of and reasons for the variations in hospital costs. Several aspects of the control of hospital costs are also dealt with, including the relationship of ambulatory to in-patient hospital care, the effective use of in-patient services by the medical staff, ways of stabilizing the hospital work load, and hospital organization.

In Volume 2 the Committee on Prepayment deals with the history and development of the various forms of hospital expense insurance, the benefit provisions constituting hospital prepayment plans, the different types of prepayment plans, the areas in which hospital prepayment plans might be extended further both as to numbers of persons covered and benefit provisions, and factors relating to the cost of hospital expense insurance.

The third volume, presenting the report of the Committee on the Non-Wage and Low-Income Groups, considers what persons might be regarded as falling in such categories, what are existing provisions for financing their hospital care, and how provision should be made for the hospital care of such individuals.

Much of the work of the Commission, as reported in Volumes 2 and 3, suffers from an important over-all limitation in that the Commission's studies dealt only with hospital care. Hospital facilities and their use are but one element of medical care, albeit an important one. The different parts of medical care are intimately interrelated, and the public interest is affected by them all. Considerable portions of Volumes 2 and 3 deal with aspects of prepayment and of the low income problem which cannot be considered in proper perspective except as a part of all medical care. The basis on which the Commission was organized and on which its funds were secured was such as to prevent such broader consideration.

MORTON D. MILLER

Examination of Insurance Companies, vol. 3, pp. xvi, 689; vol. 4, pp. xvi, 766; published by the New York State Insurance Department, New York, 1954.

These volumes supplement volumes 1 and 2 (reviewed in *TSA* VI, 223) and contain additional lectures given to Department examiners by experts in the fields considered. The lectures, while most comprehensive and detailed, mostly are no more technical than necessary for an understanding and effective examination of insurance companies. All usually encountered types of insurance are covered, with pertinent historical background, philosophy, problems, New York statutory and Departmental requirements, and a sketch of some company practices and office methods. The volumes give a mine of useful and interesting information and reference material for company managements as well as examiners.

Volume 2 dealt with the examination of assets. Volume 3 now takes up life company policy reserves, unearned premium reserves and claim reserves under

other types of insurance, and other liabilities; also dividends to life policyholders. Volume 4 discusses aspects of insurance as interstate commerce and of Public Law 15; also uniform accounting in fire and casualty insurance, the gain and loss exhibit for life and accident and health companies, and punched card systems and the use of electronics in the insurance business. The following comments will apply mainly to certain chapters relating to life insurance companies, all of which were written by individuals outside of the companies and thus are of particular interest.

The chapter on life company policy reserves first describes some mortality tables, the unsoundness of assessment or step rate renewable term insurance for the whole of life, and the desirability of life insurance and reserves on a level premium plan. The chapter also includes sections on reserves for accidental death benefits, disability benefits, substandard insurance, deferred fractional premiums at death, supplementary contracts, industrial insurance, dividend additions, ordinary annuities, group insurance and annuities, retirement plan benefits, and expenses on paid-up contracts. The subject of reserve strengthening is reviewed, with separate sections for life insurance, accidental death benefits, disability benefits, ordinary annuities, matured supplementary contracts involving and not involving life contingencies, unmatured settlement options, and noncancelable accident and health benefits. There is a short résumé of the history of reserve standards, including past discussions about mortality tables, net versus gross premium valuation, method of reserve valuation, and fixed versus flexible standards.

The chapter on dividends to life company policyholders opens with the following well justified warning: "The distribution of surplus to policyholders is one of the most intricate tasks of a life insurance company writing participating insurance." This chapter is interesting and educational and gives an excellent sketch of principle and practice. To this reviewer it is not clear how much of it could be practically applied in company examinations by persons not well versed in actuarial science. As is natural in such a complex subject, there are a few statements or opinions expressed regarding which there may be reasonable grounds for other points of view. Nevertheless, the chapter is quite worth-while.

After a preliminary discussion of basic concepts, there are sections on determination of contingency reserves, aggregate divisible surplus, sources of distributable surplus, the basic criteria of equity and practicability, methods of dividend distribution, legal principles and provisions, and practical problems regarding assessment of expenses, preferred risk policies, disability and double indemnity riders, first year dividends, settlement options, and reserve strengthening. It is pointed out that "equity" must "be considered in a broad sense."

The Contribution, Experience Premium, Asset Share, and so-called Fund methods are discussed. One statement regarding the Asset Share method might lead to misunderstandings. It is to the effect that certain actuaries "feel that asset shares are completely dependent upon the assumptions used in their construction and that, by properly choosing the assumptions, any desired result can be obtained." The reviewer's reaction to this statement is that if the asset

share calculations for dividends are based on true "experience" factors, as they are supposed to be, the results will be in accord with *facts*.

The same statement goes on to indicate that one company devised the Fund method there described "as determined more by scientific principles and less by judgment" than the Asset Share method. However, it seems to the reviewer that, consistently applied, the two methods should produce pretty much the same results. Either method requires "judgment" in assessing expenses by plan, age and policy duration, and in the determination of an experience interest rate or rates, select mortality and termination rates, etc. Also the resulting "crude" annual dividends for the subgroups must be smoothed somewhat into a consistent pattern by some sound and reasonable formula.

In volume 4, the chapter on the Gain and Loss Exhibit covers the history of the Exhibit, what it includes, and its uses and limitations.

The New York Insurance Department is certainly to be congratulated on the valuable contribution to insurance company examination represented in these volumes.

EDWARD W. MARSHALL

*M. T. L. Bizley, F.I.A., F.I.S., and A. E. Lacey, F.I.A., *Approximate Valuation of Life Assurance and Annuity Contracts*, pp. viii, 108, published for the Institute of Actuaries and the Faculty of Actuaries at the Cambridge University Press, 1954.

This textbook is intended for the use of students preparing for the examinations of the Institute and Faculty of Actuaries. In it the authors have brought together various methods of approximate valuation which have appeared in actuarial literature as far back as 1889. Most of the methods are from the actuarial literature of Great Britain. A complete list of the papers from which the methods were taken is included in the Bibliography.

The book contains ten chapters. The authors have presented in each chapter those methods of approximate valuation where there is a similarity in the line of approach. Some of the methods are, of course, restricted to certain type policies. A standard notation has been used in presenting the material. This is most helpful not only in interpreting the material but in making comparisons between the different methods.

Approximate methods of valuation described in this book fall into two groups: (*a*) those intended to replace the standard methods and (*b*) those intended to serve as a supplement to the standard methods. Methods in (*a*) not only produce results which are sufficiently close for practical purposes but also possess certain useful advantages. They may not necessarily reduce the arithmetical work. Methods in (*b*) are generally concerned with reducing the arithmetical work while keeping the errors introduced within limits. They may serve as a check on the accuracy of a valuation carried out by a different method or as an estimate on such things as the monetary effect of changing the mortality basis of the valuation. The book contains arithmetical examples of some of the

methods. It probably would have been of greater help to the student if arithmetical examples of all methods had been included.

Most of the approximate methods of valuation described were devised before the days of the multiplying punch and electronic computers. Although our needs for approximations change with conditions, this book should be helpful not only to the student in preparing for the examinations, but also to those who may wish to adapt any of these methods to meet present needs.

CHARLES W. SOUTHERN

H. Prawitz, *Investigation of Mortality from Different Causes of Death as a Basis for Forecasting the Future Trend*, Svenska Actuarieforeningen, Stockholm, 1954.

This report describes the approach utilized by a group of Swedish actuaries to obtain projected annuity mortality tables. Briefly, their methods involved an analysis of population mortality rates over a period of 20 years by age, sex, and cause of death and the projection of these mortality rates into the future, thus reflecting past improvement. The projected mortality rates for each cause of death were merged and generation tables of population mortality were formed on the basis of year of birth. By relating current population and annuitant mortality, generation annuitant tables were formed and then aggregate tables constructed so as to reproduce, for a 10-year period, monetary values based on the generation tables. Male and female mortality tables were produced for immediate and deferred annuities.

It was decided to project mortality rates by cause of death because some causes had shown rapid improvement in recent years; the mortality rates from these causes had become so low that any further improvement would have a negligible effect on the over-all mortality rate. If an over-all rate of improvement had been used, the other causes of death, which had declined slowly, would, by implication, decrease too rapidly in the future.

In their analysis of mortality rates by cause of death, use was made of the concept that there exist persons in the total population who may be said to have a predisposition to die from a specified cause or group of causes. This does not mean that these persons can die only from this cause, but merely that if the population is divided into two groups with respect to such cause, there will be proportionately more deaths from the particular cause among one group than among the other; however, both groups would show the same death rates from other causes. For practical reasons, it was assumed that no deaths from a cause involving predisposition could occur among persons not predisposed to that cause. It was also assumed that any two predispositions were mutually independent.

Population experience was preferred to annuitant experience for the analysis because of the changing character over a period of years in the class of persons who become annuitants and also because of unsatisfactory cause-of-death information on annuitants. For projection purposes, the force of mortality for

each cause category was obtained and expressed as a Makeham function ($\mu_x = A + Bc^x$) where A and B were made dependent upon the year of experience in order to incorporate the effects of improvement.

This paper outlines a quite different approach to projection from that by Messrs. Jenkins and Lew. Projection of mortality rates by cause of death may appear to be laborious but it should permit, in theory at least, more accurate forecasting. Achievement of such accuracy presupposes good estimates of future improvement. In this case, it was felt that the improvement in mortality by cause of death over the preceding 20 years was a good estimate of the future. The method employed, however, could be adapted to give effect to other estimates of future mortality improvement. The Jenkins-Lew annuity mortality study, on the other hand, gave a choice of two estimates: the one based on past experience and the other reflecting authoritative estimates of future improvement, considering the present state of medical and public health knowledge and foreseeable advances. While the Jenkins-Lew improvement rates apply to death rates for all causes combined, they reflect the effects of improvements in individual causes. Another difference in approach lies in the fact that the Swedish actuaries produced generation tables while the Jenkins-Lew paper eschewed this approach, preferring to treat improvement as a function of attained age and the year passed through.

<div align="right">ROBERT J. JOHANSEN</div>

United States Treasury Department, Internal Revenue Service, *Actuarial Values for Estate and Gift Tax* (supplementing Tables I and II and the related examples of the estate and gift tax regulations; applicable in the case of decedents dying or of gifts made after December 31, 1951), pp. iv, 58, United States Government Printing Office, Washington, 1955.

The main purpose of this pamphlet is to make available certain joint life values supplementing Tables I and II of the regulations. It is divided into three parts: Part I, Text and Examples, pp. 1–26; Part II, Glossary of Symbols and Formulas, pp. 27–29; and Part III, Tables, pp. 31–58.

Part I, divided into six chapters, gives a full explanation of the use of the tables, with examples worked out in such detail that an intelligent layman should have little difficulty in following them. An interesting and useful notation is introduced, namely capital I followed by an appropriate subscript, which denotes "the present worth of the right to receive the use of $1.00" while the status indicated by the subscript continues. In other words, it is the complete annuity value with the corresponding subscript multiplied by the interest rate. Thus, we have, in general,

$$I = i\ddot{a} = 1 - \bar{A},$$

where all three benefit symbols have the same subscript.

For completeness, Tables I and II are reproduced from the regulations, as is also a table showing adjustment factors for computing the present value of a life

annuity or annuity certain payable semiannually, quarterly, monthly, or weekly. These are the factors traditionally used for annuities certain; their appropriateness for complete life annuities follows from formulas given in *TSA* IV, 576. All tables are based on the Makehamized mortality table for total whites in the United States, 1939–41 (Table 38 of *United States Life Tables and Actuarial Tables 1939–1941*) and $3\frac{1}{2}$ percent interest. Table I gives values of the complete life annuity $\mathring{a}_x$ and the "remainder" $\bar{A}_x$ for ages 0 to 105. These have been computed by the formulas:

$$\mathring{a}_x = a_x + \tfrac{1}{2}A_x ,$$

$$\bar{A}_x = A_x \left(1 + \tfrac{1}{2}i\right) ,$$

which means that the relationship

$$\bar{A}_x = 1 - i\mathring{a}_x$$

holds exactly. Thus, if the income from a property is payable during his lifetime to an heir aged x at the death of the testator, and the property reverts on the death of (x) to a second heir, the sum of the present values of the interests of both heirs will be exactly the total value of the property. This remedies a defect in earlier estate tax regulations. Table II gives the present values of an immediate annuity for a term certain, $a_{\overline{n}|}$, and of a remainder postponed for a term certain, v^n, for terms certain from 1 to 30 years.

Table III gives the present values of last survivor assurances of $1 payable at the moment of death, $\bar{A}_{\overline{xy}}$, for all combinations of two lives whose ages are between 17 and 89, inclusive. Table IV gives factors "F" and "B" for contingent assurances. If (x) is the younger life, contingent assurances are computed by the formulas:

$$\bar{A}^1_{xy} = (\bar{A}_{xy} + B) - F\bar{A}_{xy},$$

$$\bar{A}_{xy}^{1} = F\bar{A}_{xy} - B .$$

The factors B and F depend only on the difference $h = y - x$, the Makeham constants A and c, and the rate of interest, and were computed by the formulas:

$$B = \frac{A}{\delta} \frac{c^h - 1}{c^h + 1} ,$$

$$F = \frac{(1 + A/\delta)\, c^h - A/\delta}{c^h + 1} ,$$

which are obtained by an ingenious adaptation of formula (11.40), page 204, of Jordan's *Life Contingencies*. The table covers values of h from 0 to 79 years.

Table V gives single life commutation columns D_x, $\mathring{N}_x = N_{x+1} + \tfrac{1}{2}M_x$, and $\overline{M}_x = M_x(1 + \tfrac{1}{2}i) = D_x - i\mathring{N}_x$ for ages 0 to 105, while Table VI gives values of l_x, d_x, and μ_x for ages 0 to 105. Table VII reproduces the table of uniform

seniority for two lives previously published as Table 37 of *United States Life Tables and Actuarial Tables 1939–1941*. This shows the addition to be made to the age of the younger of two lives (when both lives are aged 17 or older) in order to obtain the equivalent equal age, for differences of 0 to 75 years between the ages of the two lives. Table VIII gives the present values of complete joint life annuities of \$1 per annum on two, three, and four lives of equal age for ages 17 to 105.

Table IX gives the values of a factor to be applied to the value of a property in order to obtain the present value of the interest of the older spouse when the income from the property is shared equally by the spouses during their joint life, and the property reverts to the survivor on the death of either spouse. The formula for this factor is $\frac{1}{2}I_{xy} + \bar{A}_{\frac{1}{xy}}$, where x is the age of the younger life. Substituting for the contingent assurance in terms of the factors B and F, this factor may also be expressed as $B + \frac{1}{2} - (F - \frac{1}{2})\bar{A}_{xy}$.

The single life commutation columns in Table V are used in obtaining the present values of complete temporary life annuities, temporary assurances payable at the moment of death, and pure endowments. Joint life annuities on two lives are evaluated by means of the table of uniform seniority, while the method of averaging the values of μ_x is employed in the case of three or four lives. It is not brought out that the present value of a complete joint and survivor annuity on two lives could be computed from Table III by means of the relation

$$\mathring{a}_{xy} = \frac{I_{\overline{xy}}}{i} = \frac{1 - \bar{A}_{xy}}{i}.$$

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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.

LIFE INSURANCE AND ANNUITIES

Analysis of Practices in Reporting and Allocation of Income and Expenses by Life Insurance Companies, a report by Deputy Superintendent Adelbert G. Straub, Jr., to Hon. Alfred J. Bohlinger, Superintendent of Insurance, pp. ix, 36; Appendix, pp. v, 38; Insurance Department, State of New York, 1954.

This report is the third in a series recently prepared by the staff of the New York Insurance Department on the practices of life insurance companies in the reporting and allocation of income and expenses. The information supporting the Department's study of these practices was obtained from a questionnaire submitted in three parts to companies doing business in New York State. The first report, entitled *Allocation of Expenses by Life Insurance Companies—Responses to Questionnaire Part I*, by Deputy Superintendent George H. Kline, gives a statistical summary of the methods used by 62 companies in reporting some 190 items of income and expense in the annual statement. The second report, entitled *Case Studies on Allocation of Income and Expenses by Life Insurance Companies*, by Mr. Straub, presents the methods used by each of 35 companies in allocating income and expenses to lines of business and between insurance and investment functions, as obtained from Parts II and III of the Department's questionnaire.

In this latest report, Mr. Straub discusses the historical background of the annual statement blank, the factors leading to the Department's study and the scope of the study. The Appendix contains a copy of Regulation 33 covering the reporting and allocation of income and expenses of life insurers.

W. Van Eenam, "Group Life Insurance for Federal Employees," *Social Security Bulletin*, October 1954.

This law, enacted in August 1954, provided for $7–8 billion of group life insurance plus a corresponding amount of accidental death and dismemberment benefits to cover virtually all civilian employees of the Federal Government. Although the plan is centrally administered, the risk is divided up among practically all insurance companies selling group life insurance. Coverage is automatic, but the individual employee may elect to stay out. The face amount of insurance in each case is approximately one year's salary until age 65, after which it is reduced by 2% per month, but to not less than 25% of the original amount. Insurance is also provided on the same basis for most individuals retiring in the future as for active employees. Presently retired employees are not covered. The employee contribution rate is 25 cents biweekly per $1,000 of insurance, payable until age 65 or prior retirement. The Government contribution is not more than half the amount paid by the employees. However, the law does not provide what will happen if this is insufficient for the prescribed benefits. Any excess of employee and Government contributions over the net cost charged by the insurance companies will be used to build up a contingency reserve.

J. Young, "Experiments in Connexion with Returnable Premiums in Group Pension Schemes," *Transactions of the Faculty of Actuaries*, vol. 22, part 3, no. 183, p. 97, 1954.

An approximate method is developed for the valuation of the death benefits prior to retirement arising from employee contributions under Group pension schemes. The approximation involves the use of factors which are independent of age but designed to be representative of the whole distribution of ages for a particular group. The author

also develops corresponding approximate methods for use in the calculation of premiums and surrender values.

It is interesting to note that somewhat similar approximations have been developed and used in this country in the valuation of death benefits under Group Annuity contracts.

G. W. E. Allaway, "The Practice of Industrial Assurance," *Journal of the Institute of Actuaries Students' Society*, vol. 13, part 1, p. 1, November 1954.

The author presents a general, nontechnical description of the methods used in conducting the Industrial insurance business in Great Britain. The description includes the regulation of Industrial insurance, the debit premium accounting system used, agents' compensation, the types of policies issued and the nature of the proposal (application) form. Also included is a reference to the fact that statutes prescribe minimum nonforfeiture values and require that nonforfeiture notices be sent. A brief description of Industrial claim practices is included and a reference is made to the British counterpart of the facility of payment clause.

K. F. Gardner, "Practical Aspects of the Industrial Branch Valuation," *Journal of the Institute of Actuaries Students' Society*, vol. 13, part 1, p. 22, November 1954.

The author describes for Industrial insurance the office methods employed by his company in maintaining the in-force records, making the annual year-end valuation and assembling collateral information such as preparation of the Return (counterpart of our policy exhibit) and estimating the cost of bonus declarations. The description traces the in-force maintenance procedure starting with reports by the agents of lapses (cessation of premium payments and claims) and reports of issue through to the assembly of the basic valuation in-force which shows number of policies, amount of insurance, net annual premium and gross annual premium in year-plan-age detail. A net premium valuation is made using a prospective type formula. The valuation schedule is so arranged as to produce also a gross premium valuation.

H. W. Dingman, M. D., *Risk Appraisal*, pp. viii, 781, The National Underwriter Company, Cincinnati, Ohio, 1954.

This is a completely revised edition written in the author's terse, logical, and understandable manner. Section I (211 pages) deals with principles of risk selection and the various lay underwriting factors. Section II (459 pages) contains a detailed treatment of medical impairments and describes at some length how each impairment affects insurability. Section III (102 pages) contains comments on Nonmedical, Industrial, Unemployment, Annuities, Group, Hospitalization, Standards and Tests, 1951 Impairment Study, and a comprehensive index.

A. F. Hewat and C. S. Penn, "Life Assurance Underwriting," *Transactions of the Faculty of Actuaries*, vol. 22, part 4, no. 184, p. 165, 1954.

The authors survey the British approach to the medical aspects of life insurance underwriting with regard to the important physical impairments together with comments on their significance. Although the paper gives an obvious impression of similarities with the underwriting problems on this continent, some differences in practice are nevertheless evident. Quite different is the value placed upon the accumulation of mortality statistics on impaired lives and the credibility attributed to the interpretation of them. It is a commentary upon the persisting effect of the atmosphere in which an actuary receives his early training. The preponderance of opinion among the actuaries

of Great Britain is that the accumulation of such statistics is impracticable and futile. On this side of the Atlantic, the accumulation of data is not only considered valuable but is carried out on a wide scale and the interpreted results are made an indispensable part of daily operation. As a consequence, British actuaries appear to lean more heavily upon their medical officer for the routine classification of risks than is usual in this country.

There are two differences in British and American practice. The British apparently issue short term endowments at standard premium rates for certain impairments characterized by deferred extra mortality when other forms would be issued only with substandard rates. This practice was once more common in this country than at present. Still another practice referred to several times is the use of decreasing liens as a method for insuring impaired lives. Such liens are not regarded favorably here.

W. Phillips, "A Basic Curve of Deaths," *Journal of the Institute of Actuaries,* vol. 80, part III, no. 356, p. 289, 1954.

The author sets out:

"(i) To hypothesize the existence of a Basic Curve of Deaths . . . applicable not only to humanity, but equally to all forms of life.

"(ii) To seek a representation of that curve by a function containing as few parameters as possible. . . ."

Biological and cosmological considerations lead the author to a curve of deaths containing two parameters which is shown to fit the A1924–29 Table very well. Comparisons are also made with other insurance and population mortality experiences.

K. A. Evelyn, "The Natural History and Prognosis of Hypertension," *Proceedings of the American Life Convention,* Medical Section, 1954, p. 44.

The course followed from the initial to final stages of hypertensive disease is illustrated by numerous clinical records of blood pressure readings. Typical patterns are traced with comments on the prognosis for survival.

W. Bolt and J. J. Hutchinson, "Urinary Sediment: Past Experience as a Guide to Future Mortality Studies," *Proceedings of the American Life Convention,* Medical Section, 1954, p. 32.

Persisting variation in company laboratory practices in the examination of urinary specimens for casts, red cells and pus cells makes the valid interpretation of mortality statistics difficult. The author urges the use of the method outlined by the Committee on Laboratory Procedures of the Association of Life Insurance Medical Directors for the collection and recording of data in a homogeneous fashion.

ACCIDENT AND SICKNESS INSURANCE

*M. R. Cueto, *Monetary Values for Ordinary Disability Benefits, Based on Period 2 Graduated Rates of Disablement and 1930–50 Graduated Termination Rates from 1952 Reports Combined with CSO Mortality—2½% Interest,* vol. 1, pp. xvii, 270; vol. 2, pp. iii, 114, published by the Society of Actuaries, Chicago, 1954.

The Society of Actuaries Committee on Disability and Double Indemnity presented in 1952 the results of an intercompany study of the experience under certain ordinary disability benefits between the 1930 and 1950 anniversaries. Monetary values based on the new data have been prepared for the primary purpose of furnishing material which can be used to test reserves for disability benefits (active and disabled lives) in comparison with the reserves based on tables currently in use.

The monetary values shown in Volume 1, for each of the Benefits 1 to 5, inclusive, described in the 1952 Reports, are based on the Period 2 (1935–1939) graduated rates of disablement—first two policy years excluded—and the 1930–1950 graduated termination rates, combined with 1941 CSO Mortality Table and $2\frac{1}{2}\%$ interest. Corresponding values on the Period 4 (1946–1950) basis are shown in Volume 2.

The five benefits are:

Benefit 1.—The "total and permanent" clause, under which the probable permanence of the disability had to be established on the merits of each case; providing waiver of premiums plus a monthly life income during continuance of total permanent disability of $10 per thousand of life insurance. Issued chiefly from about 1918 to early in 1930.

Benefit 2.—The 90-day "presumptive" clause, under which it was a matter of contract that permanence would be presumed where total disability had continued for 90 days; providing waiver of premiums plus a monthly income of $10 per thousand of life insurance; no monthly income benefits for first three months (except where disability was adjudged permanent without reference to the presumptive clause). Issued chiefly from 1921 to early 1930.

Benefit 3.—90-day presumptive clause providing monthly income of $10 per thousand of life insurance combined with waiver of premiums, as in the case of Benefit 2, but with income benefits retroactive to cover the first three months. Issued chiefly from 1925 to early in 1930.

Benefit 4.—120-day waiting period clause, under which total and permanent disability was defined as total disability which had lasted 120 days; providing monthly income of $10 per thousand of life insurance combined with waiver of premiums; no income benefits for the first four months. Issued in 1930, 1931, and a few months in 1932.

Benefit 5.—6 months waiting period clause, providing waiver of premiums only; issued only when applied for, subject to a specific extra premium. Issued after 1931. The similar benefit which is automatically included by some companies in all policies issued was not studied.

Volume 1 is a reprint, with expanded tables from Volume VI of the *Transactions*. It includes the following sections a to i inclusive for Benefits 1 to 4 inclusive and sections a to e inclusive and h and i for Benefit 5.

Section a: Disabled Life Annuities—

$$\bar{a}^{\,i}_{[x+1/2]\,+m/12:\overline{u-x-(6+m)/12}|}$$

Section b: Rates of Disablement and Commutation Columns—

$$r'_x,\ C^r_x,\ _{60}M^r_x,\ ^{\omega}\bar{C}^r_x,\ ^{\omega}\bar{M}^r_x$$

Section c: Commutation Columns—$^{\bullet}\bar{C}^r_x$

Section d: Commutation Columns—$^{\bullet}_{\bullet}\bar{M}^r_x$

Section e: Net Annual Premiums for Waiver of $100 Annual Premium

Section f: Net Annual Premiums for $10 Monthly Income for Life

Section g: Net Annual Premiums for $10 Monthly Income to Age u

Section h: Disabled Life Reserves for claims by date of disablement

Section i: Disabled Life Reserves for claims by date of disability

Premiums in sections e and g for Benefits 1, 2, 3 and 4 are not shown for $u = 86$ to 95 inclusive.

Volume 2 includes the same sections as shown above except sections a, h and i.

S. D. Collins, K. S. Trantham, and J. L. Lehmann, *Sickness Experience in Selected Areas of the United States*, pp. 96, Public Health Monograph No. 25, U.S. Department of Health, Education, and Welfare, Washington, 1955.

The experience of six general population sickness surveys taken in different places at various periods from 1928 to 1943 are combined in this report. Morbidity rates specific for age and sex are presented for disabling, bed, and nondisabling illnesses, separately for respiratory and nonrespiratory causes. Age specific rates and days of disability are shown for detailed morbid conditions. Short-term hospital admission rates, by age and sex, are presented for acute and chronic illnesses and for cases of surgical and of nonsurgical treatment. Data are also given regarding patients in institutions for long-term care, the distribution of hospital cases by days of care, and the trends of hospital admissions and days of care in relation to trends of illness in general.

Measurement of Morbidity, pp. iii, 12, Studies on Medical and Population Subjects, Number 8, General Register Office, H.M. Stationery Office, London, 1954.

The stated purpose of this report is to "encourage the experimental use of the definitions proposed in it, to stimulate wider discussion of the subject and to provoke constructive criticism." The difficulties in compiling morbidity statistics are briefly summarized and definitions are proposed for rates relating to the inception of illness, its prevalence, its duration, and to fatality. The use of these proposed rates is indicated for several sources of information, taking into account the purposes and the units normally recorded.

SOCIAL SECURITY

Great Britain, Ministry of Pensions and National Insurance, *Reasons Given for Retiring or Continuing at Work*, pp. 142, H.M. Stationery Office, London, November 1954.

This report presents the results of an inquiry made in Great Britain of some 29,000 retired persons in October 1953. The investigation went into reasons why persons retired promptly at the minimum age or why they continued to work. Separate consideration was given to persons who continued working after pensions were automatically payable which is five years after the minimum retirement age.

About 40% of the men reaching the minimum retirement age of 65 actually retired; over one half of them retired because of ill health or chronic sickness, while about one quarter retired because of the employer's action (60% of these received a pension from the employer), and the remainder gave miscellaneous reasons such as a wish for rest or leisure. About half of the men who continued working after age 65 did so because of financial need; about a quarter of the cases continued because they felt well enough to do so, and the remainder because they preferred to work. Almost all of those who continued working knew that a higher pension would result from the postretirement increments, but less than 1% said that this was the reason for working, although 25% said that this had some influence. The data for women were much less conclusive because of the smaller numbers involved and also because many women received pensions through their husbands rather than in their own right. The investigation also covered other characteristics of the individuals involved, such as occupation, industry, residence, previous receipt of temporary sickness benefits, and doctor's advice on desirability of retirement.

House of Representatives, Committee on Ways and Means, *Social Security After 18 Years, a Staff Report*, pp. 78, August 20, 1954.

This report, not released until December 1954, is "a factual report showing what is the present social security program for the aged and their dependents, and for their

survivors." The report is drawn from the investigation held by the Curtis Committee in the latter half of 1953. The first three sections deal, respectively, with the old-age assistance program, the program for aid to dependent children, and the old-age and survivors insurance program. In each case, consideration was given to the historical development of the eligibility conditions, the "right" to receipt of payments, the amount of payments, and the costs and methods of financing. The fourth section examines the similarities and differences of the basic principles of public assistance and OASI. The "right" to payments under both programs is statutory and conditional and therefore can be changed at any time by legislative action to fit changing social conditions and needs. Further, the statutory "right" to receive payments under either program does not categorically depend upon a previous record of tax payment. Also, payments under both programs have been financed largely from current taxes. The differences between the assistance programs and OASI are stated to be (1) OASI distributes social benefits without a means test, and (2) eligibility conditions for OASI are on a nation-wide statutory basis, whereas for public assistance eligibility is determined on a State by State basis, according to budgetary standards and resources of the individuals concerned. The appendix contains, in addition to several statistical tables, a memorandum of December 23, 1953, summarizing some major findings of the public hearings.

United States Congress, House of Representatives, *Report of the Select Committee on Survivor Benefits*, Report No. 2682, 83rd Congress, pp. 11, December 17, 1954.

Toward the close of the 83rd Congress, a select committee comprising representatives from three standing committees of the House of Representatives was appointed to study the survivor benefit provisions for members and former members of the Armed Forces. In part, at least, this study was brought on by the recommendations in this field made by the Kaplan Committee. The select committee held hearings at which representatives from a number of Governmental and outside organizations testified. The report summarizes the existing survivor benefit programs and then gives the Kaplan Committee recommendations. Finally, the findings and recommendations of the select committee are set forth. Most of this is on a rather tentative basis, with the need for more study being pointed out. In regard to the Kaplan Committee proposal that OASI coverage should be extended to the Armed Forces on the same contributory basis as for other employees, the select committee found that many witnesses strongly urged this; accordingly, it was recommended that "serious consideration should be given to taking such action." The select committee attacked the Kaplan Committee's conclusions that its plan to extend OASI coverage would save the Federal government more than $100 million annually. Rather, the select committee believes that the Kaplan proposal would be more costly than the present system.

R. J. Myers, "Old-Age and Survivors Insurance: Retirement Test Under the 1954 Amendments," *Social Security Bulletin*, December 1954.

The "work clause" or retirement test provision of the Old-Age and Survivors Insurance system restricts payment of benefits to persons who are engaged in substantial employment. The 1954 Amendments to the Social Security Act drastically revised this provision. The test is not applicable to those age 72 and over (formerly age 75). For all others, full benefits are paid if total earnings (whether or not in covered employment—formerly based only on covered earnings) are $1,200 or less in a year (for employees, formerly on a monthly basis of $75). If earnings exceed $1,200 in a year, benefits are

withheld in the amount of one month's benefits for each $80 of excess earnings or fraction thereof (for employees, formerly no benefits were paid in a month if the exempt amount of earnings was exceeded), except that benefits are always paid for a month in which wages were $80 or less and there was no substantial self-employment. The article describes the basis of the previous provisions, the experience thereunder, and the new provisions, including their legislative history and several illustrative examples of how they operate. Cost aspects of the retirement test are indicated, including an analysis of the cost of eliminating it completely (namely, almost $1\frac{1}{2}\%$ of payroll on a level-premium basis, with the current annual cost being almost $2 billion).

*R. J. Myers and E. A. Rasor, *Long-Range Cost Estimates for Old-Age and Survivors Insurance, 1954*, pp. 50, *Actuarial Study No. 39*, Social Security Administration, December 1954.

This study presents detailed cost estimates for the Old-Age and Survivors Insurance as modified by the 1954 amendments. The basic assumptions are set forth in detail and the main body of the report discusses the results of the cost estimates, along with a number of tables showing covered and insured populations, beneficiaries, benefit payments (both in absolute terms and relative to payroll), and progress of the trust fund (under the existing contribution schedule and under several hypothetical schedules). According to the intermediate-cost estimate, the system is somewhat underfinanced by the tax schedule now in the law (rising to a combined employer-employee rate of 8% in 1975)—by about 0.4% of payroll on a level-premium basis at 2.4% interest. The study also presents summary figures for the accrued liability of the OASI system (currently about $350 billion, of which only about $21 billion is "funded"). Finally, a brief comparison is made of the cost estimates for the present program with those for the law as it was previously over the course of the past two decades.

R. J. Myers and J. A. MacDougall, "The Railroad Retirement Act in 1954," *Social Security Bulletin*, February 1954.

This article summarizes two important amendments to the Railroad Retirement Act made in 1954. From a broad social security standpoint, probably the major change was the reduction of the minimum retirement age for widows from 65 to 60. At the same time, these amendments relaxed certain provisions preventing duplication and overlapping of Railroad Retirement and Old-Age and Survivors Insurance benefits. The maximum wage base was raised from $300 to $350 a month (in line with similar action under OASI). As a result of the latter change, future benefits will be increased, but this will have only a slight immediate effect because the Railroad Retirement system does not have any "new start" provisions; rather, in essence, benefits are based on average earnings over the entire period of employment. In addition, the article analyzes the cost effects of the various changes made and also the operating experience under the financial interchange provision with the OASI system.

U.S. Department of Health, Education and Welfare, Social Security Administration, Report No. 19 of Division of Research and Statistics, *Old-Age, Survivors, and Invalidity Programs Throughout the World, 1954*, pp. xiii, 122, Washington, 1954.

This report contains details regarding the old-age, survivors, and invalidity social security programs of 50 different nations and also provides a summary of countries having other types of social security programs. For each country the laws are analyzed according to the following items: dates of basic laws, coverage, source of funds, benefit amounts, types of benefits, eligibility qualifications, and administrative organization.

*State of Indiana, *Report of the Public Employee Retirement Funds Study Commission, 1954*, pp. 120, Indianapolis, Indiana, November 15, 1954.

*State of New York, *Report of the State Commission on Pensions on Advisability of Co-ordinating Social Security Coverage and Benefits Provided by Public Employee Pensions in New York State*, pp. 58, Williams Press, Inc., Albany, January 17, 1955.

These two reports from state pension commissions are timely and pertinent because of the provision in last year's Amendments to the Social Security Act authorizing the states to extend OASI coverage to all state and local government employees, whether or not in a public pension system (except policemen and firemen covered by such a system). They should be of special interest and value to members of the Society of Actuaries, especially those concerned with pension problems in relation to OASI, not only because of their subject matter and general quality, but because the commission chairmen, Walter O. Menge for Indiana and Reinhard A. Hohaus for New York, are Fellows of the Society.

The commissions and their reports have significant similarities and differences, only some of which can be mentioned here. Thus the New York Commission is a reactivation and enlargement of a body created in 1922 on a permanent basis, while the Indiana Commission was a temporary body scheduled to go out of existence when its report was completed. As indicated in its title, the New York Report deals with one special assignment of the Commission as distinct from its continuing functions, namely the question of coordination. After reviewing various pros and cons the Report is emphatic in stating that the "social need of survivorship protection for public employees, especially protection for widows with young children, is so cogent and urgent as to transcend in importance any of the objections" and that "some practical and desirable plan of co-ordination can be formulated." It recommends that further studies be authorized to lay down precise specifications with estimates of cost. The Indiana Report covers a broad study, including actuarial valuations, of the various state plans, as well as the problem of coordination, which latter is pursued to the point of incorporating recommendations in a proposed Bill. The Commission in this case had some 20 months in which to function, as compared with 9 months in the case of New York.

Both reports furnish concise outlines and interpretations of much information not hitherto published or readily available in one place. Both are well fortified with statistics, which for the most part are relegated to Appendixes and so do not clutter the body of the narrative.

United States Department of Labor, Bureau of Employment Security, *State Studies in Unemployment Insurance Financing*, pp. 14, Washington, October 1954.

A detailed bibliography of 36 completed State studies of unemployment insurance programs, of which 32 have been published, is given in this brief report. On the whole, each study includes (1) an economic analysis of the past and a set of alternative projections for the future, (2) statutory and financial history of the program, along with possible future changes being completed, and (3) actuarial cost estimates and reserve valuations.

L. O. Shudde, "Orphans in the United States, July 1, 1953," *Social Security Bulletin*, July 1954.

An estimate is made of the total number of orphans under age 18 in the United States as of the middle of 1953. Figures are given for each single age and separately for paternal only orphans (1.9 million), maternal only (.9 million), and full orphans

(66,000). Corresponding figures for ages 0 to 17 combined are also given for October 1949, and both sets of figures are related to total child population. Orphans receiving OASI benefits in the middle of 1953 represent almost half of all paternal and full orphans, with this proportion being over 60% for the youngest children. With the extension of OASI coverage and the maturing of the system, this proportion will, within a few years, rise considerably (in the reviewer's estimate, to well over 90%).

An extension of this study has been published in the *Social Security Bulletin* for March 1955. The earlier estimates by Dublin, Lotka, and Spiegelman are adjusted to apply to the total population and to the same age group so as to have a consistent series of figures relating to orphans under age 18. Accordingly, data are available for 1920, 1930, and 1940 as well as for 1949 and 1954. The total number of orphans under age 18 decreased from 6.4 million in 1920 to 2.7 million in 1954; the corresponding figures for paternal only orphans dropped from 3.4 million to 1.8 million. The most striking decrease, however, was for full orphans—from 750,000 to 60,000.

OTHER TOPICS

U.S. Department of Health, Education, and Welfare, Public Health Service, National Office of Vital Statistics, "United States Life Tables, 1949–51," *Vital Statistics— Special Reports*, vol. 41, no. 1, p. 1, November 23, 1954.

This report, which is based upon the mortality experience for the general population, presents the principal life table functions at single ages from birth. Separate tables are presented for the total population, the white population, and the nonwhite population, and also for males and females in each of these categories. For ages 5 years and over, the basic data are recorded deaths during 1949–1951, and the Census of Population taken as of April 1, 1950, without adjustment to the central date of the 3-year period. For ages under 5 years, the population exposed to death during 1949–51 was developed from births in each of the 8 years 1944 to 1951 and from deaths during the same period. No further details regarding the methods employed in the computation of the life tables are given in the report. However, a detailed account is in course of preparation. The table on page 182 compares the mortality rate and complete expectation of life at specimen ages from this report with corresponding data from selected earlier reports. Comparable data for the general population of Canada are shown at the bottom of the table; these have been abstracted from *Canadian Life Table, 1951*, Reference Paper No. 50, Dominion Bureau of Statistics, 1953.

P. R. Cox, *Addendum to Demography*, pp. viii, 64, published for the Institute of Actuaries and the Faculty of Actuaries at the Cambridge University Press, 1955.

In this addendum, the author's book, "Demography," published in 1950, is brought up to date with an account of developments during 1949–54. For the most part, the new matter relates to the demography of England and Wales. Among the items featured are the work of the Royal Commission on Population, the 1951 census of Great Britain, and the preliminary report of occupational mortality in England and Wales based upon an analysis of deaths in 1950 and the one percent sample of the 1951 census.

Conference on Research in Income and Wealth, *Long-Range Economic Projection*, pp. x, 476, a report of the National Bureau of Economic Research, New York, published by the Princeton University Press, 1954.

This publication of the National Bureau of Economic Research is a symposium of the more significant factors in our economy prepared by leading economists. The subjects

MORTALITY RATES AND COMPLETE EXPECTATION OF LIFE FOR THE UNITED STATES AND CANADA AT SELECTED AGES, BY SEX, FOR SPECIFIED PERIODS

Race, Sex, Period	1,000 q_x				$\overset{\circ}{e}_x$			
	0	20	40	60	0	20	40	60
	United States							
White males								
1900–02	133.45	5.94	10.60	28.59	48.23	42.19	27.74	14.35
1929–31	62.32	3.18	6.79	26.44	59.12	46.02	29.22	14.72
1939–41	48.12	2.12	5.13	25.48	62.81	47.76	30.03	15.05
1949–51	30.69	1.62	3.91	23.81	66.31	49.52	31.17	15.76
White females								
1900–02	110.61	5.54	9.31	25.06	51.08	43.77	29.17	15.23
1929–31	49.63	2.77	5.32	20.63	62.67	48.52	31.52	16.05
1939–41	37.89	1.45	3.68	17.14	67.29	51.38	33.25	17.00
1949–51	23.55	.73	2.42	13.40	72.03	54.56	35.64	18.64
Nonwhite males								
1900–02	253.26	11.89	16.58	43.98	32.54	35.11	23.12	12.62
1929–31	87.32	8.58	18.13	41.40	47.55	35.95	23.36	13.15
1939–41	82.28	5.44	13.62	39.10	52.26	39.52	25.06	14.37
1949–51	50.89	3.14	8.79	36.76	58.91	43.73	27.29	14.91
Nonwhite females								
1900–02	214.75	11.39	15.56	39.51	35.04	36.89	24.37	13.60
1929–31	72.04	8.82	16.25	42.20	49.51	37.22	24.30	14.22
1939–41	65.84	5.32	11.81	34.72	55.56	42.04	27.19	16.10
1949–51	40.87	2.27	7.70	29.54	62.70	46.77	29.82	16.95
	Canada							
Males								
1930–32	86.95	3.08	4.94	19.38	60.00	49.05	31.98	16.29
1940–42	62.50	2.41	4.28	20.29	62.96	49.57	31.87	16.06
1950–52	43.25	1.72	3.28	20.71	66.33	50.76	32.45	16.49
Females								
1930–32	69.31	2.95	5.12	17.14	62.10	49.76	33.02	17.15
1940–42	49.31	1.80	3.86	15.28	66.30	51.76	33.99	17.62
1950–52	34.23	.91	2.57	13.08	70.83	54.41	35.63	18.64

NOTE.—United States: data for 1900–02 relate to the Original Death Registration States and the District of Columbia; all other periods relate to the entire continental United States. In all periods but 1949–51, the nonwhite figures relate only to Negroes.

Canada: excludes data for Yukon and Northwest Territories; 1950–52 includes Newfoundland which entered the Confederation in 1949.

explored include capital formation, gross national product, agricultural and industrial output, government expenditures and other fundamental components of economic life. Extensive tables and charts serve to clarify the text. The studies included in this report outline a trend toward a wider dispersion of income and spending and in credit utilization. The studies explore the effect of these changes on the demand for durable goods, savings, capital formation, production and prices. Although accurate long term economic forecasts may be impossible, these studies contain sufficient factual historical information to enable the reader to have a clearer understanding of the extent and direction of current economic trends.

Progress Report on Electronics, Research Committee, Casualty Actuarial Society, 1954.

A brief description is given of various kinds of electronic data processing systems and the need is pointed up for insurance companies to begin preparing themselves immediately for the important changes to come. The report then proceeds to outline a program which should lead a company, quite naturally, into the proper use of electronic equipment. The program suggests the appointment of an Electronic Coordinator and calls for executive appreciation, supervisory attention and employee interest. It further suggests that a company establish a master plan as a goal toward which to work, bit by bit. A series of appendixes describe certain fire and casualty operations and indicate the manner in which they might be approached with electronic equipment.

Electronic Systems: A Report on Demonstrations of Insurance Problems, Report No. 1, Electronics Committee, Life Office Management Association, July 1954.

This report covers sketchily the results of demonstrations made to indicate the applicability of three electronic data processing systems to life insurance operations. The IBM 650 Drum Computer, a punched card computer with stored program facilities, was used to demonstrate the calculation of dividends on individual Ordinary policies. The policies involved were dealt with in random order and the computer was required to generate as needed the tabular dividend per $1,000 and the dividend for the policy. Where indicated, paid-up additions, premium less dividend, and dividends at interest were also determined.

The second demonstration involved the use of a Univac System—magnetic tape processing equipment. It was used to demonstrate an approach to Ordinary policy service work known as the "Combined Operations Plan." The demonstration showed how the changes to be made in a policy file on magnetic tape would be collected, along with necessary instructions, on to a "Change Assembly Tape." This tape, machined through the Computer with a "Master File Tape" and other instruction tapes, produced a new Master File Tape reflecting the changes, a Results Tape (containing among others, the policies to be billed) and a Schedule Tape containing policies on which some action is required (maturities, premium cessation, etc.). The Results Tape, after editing by another pass through the Computer, was used to prepare combined premium, dividend and loan notices on a High Speed Electro-mechanical Printer.

The third demonstration involved the use of a laboratory model of the Bizmac System—magnetic tape processing equipment. Starting with a tape which contained the policies to be billed (previously extracted from a File tape and sorted in dividend group order) and the File tape, the electronic system proceeded to develop a new up-to-date File tape, a billing tape to be used for writing premium notices, and other tapes for related purposes.

More complete descriptions of these demonstrations are on file at the L.O.M.A. offices in New York and are available for loan to member companies.

J. F. McCloskey and F. N. Trefethen, editors, *Operations Research for Management*, pp. xxiv, 409, The Johns Hopkins Press, Baltimore, 1954.

This is a collection of papers on operations research selected from a series of seminars on the subject at Johns Hopkins University. The papers have been organized into three sections; general, methodology, and case histories. The first section considers operations research as a science and profession, its incorporation into a business organization, and its relation to scientific management as developed by Frederick Taylor and his associates. The methodology section provides an introduction to several of the techniques often found useful in operations research—statistics, queueing theory, information theory, suboptimization, symbolic logic, linear programming, game theory, and large-scale computers. The final section illustrates the application of operations research to various specific problems in business and military affairs.