

**BRITISH OFFICES LIFE TABLES, 1893: AN  
ACCOUNT OF THE PRINCIPLES AND METHODS  
ADOPTED IN THE COMPILATION OF THE DATA,  
THE GRADUATION OF THE EXPERIENCE AND  
THE CONSTRUCTION OF DEDUCED TABLES:  
ASSURED LIVES AND LIFE ANNUITANTS**

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British Offices Life Tables, 1893: An Account of the Principles and Methods Adopted in the Compilation of the Data, the Graduation of the Experience and the Construction of Deduced Tables: Assured Lives and Life Annuity by Institute of Actuaries (Great Britain)

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**INSTITUTE OF ACTUARIES (GREAT BRITAIN)**

**BRITISH OFFICES LIFE TABLES, 1893: AN  
ACCOUNT OF THE PRINCIPLES AND METHODS  
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THE GRADUATION OF THE EXPERIENCE AND  
THE CONSTRUCTION OF DEDUCED TABLES:  
ASSURED LIVES AND LIFE ANNUITANTS**



## INTRODUCTION.

(1). The present volume completes the series proposed to be published by the Joint Committee of the Institute of Actuaries and the Faculty of Actuaries in Scotland on Mortality Investigation. It contains a series of detailed accounts of the technical processes and methods adopted by the Committee, and in this Introduction the opportunity has been taken of making a statement as to the general conduct of the investigation.

(2). The investigation was commenced in the year 1893, and has since 1897, been conducted by Committees of the Institute and Faculty, respectively designated the "London Section" and the "Scottish Section." Meetings of these Sections were held separately in London and Edinburgh for preliminary discussion; and combined meetings of the two Sections were held in London to discuss and decide the matters of principle which arose from time to time in the progress of the work.

(3). The Joint Committee was constituted as follows:—

### CHAIRMAN OF COMMITTEE.

RALPH PRICE HARDY.

### LONDON SECTION.

*THOMAS GANS ACKLAND.	GEORGE KING.
ARTHUR FRANCIS BURRIDGE.	*GEORGE JAMES LIDSTONE.
HENRY COCKBURN.	HENRY WILLIAM MANLY.
†ALEXANDER JOHN FINLAISON, C.B.	GERALD HEMMINGTON RYAN.
GEORGE FRANCIS HARDY.	FREDERICK SCHOOLING.
RALPH PRICE HARDY.	WILLIAM JOSEPH H. WHITTALL.
CHARLES DANIEL HIGHAM.	FRANK BERTRAND WYATT.
*WILLIAM HUGHES.	THOMAS EMLEY YOUNG, B.A.

### SCOTTISH SECTION.

DAVID DEUCHAR.	JAMES MEIKLE.
*GORDON DOUGLAS.	THOMAS BOND SPRAGUE, M.A., LL.D.
*NIRL BALLINGAL GUNN.	SPENCER CAMPBELL THOMSON, B.A.
GEORGE MACRITCHIE LOW.	ANDREW HUGH TURNBULL.

GORDON DOUGLAS,

*Hon. Secretary of Scottish Section.*

A. F. BURRIDGE, { *Hon. Secretaries of*  
THOMAS G. ACKLAND, { *London Section, and*  
                                  { *of Joint Committee.*

\* Elected in the course of the investigation.

† Died " " "

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H. P. R.

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(4). The following Joint Letter was sent out in December, 1893, to all those Companies whose experience, in respect of Assured Lives or Annuitants, it was thought desirable to include :—

INSTITUTE OF ACTUARIES,  
STAPLE INN HALL, HOLBORN,  
LONDON, W.C.

FACULTY OF ACTUARIES IN SCOTLAND,  
24, YORK PLACE, EDINBURGH.

DEAR SIR,

NEW MORTALITY EXPERIENCE.

It has been resolved to attempt the compilation of a new collective Mortality Experience of Assured Lives, and separately of Annuity Nominees, in the United Kingdom. The most recent Tables of the kind as regards Assured lives were formed upon observations which terminated thirty years ago, while the Annuity tables comprise only the Government Experience. Changes have taken place in the condition of the population, which render it by no means improbable that the rate of Mortality is not now the same as formerly. The Institute of Actuaries' Tables, valuable as they have proved, were based on an experience which, compared with the amount of material now accumulated in the records of the Offices, must be considered very limited. Moreover, the Institute of Actuaries' Tables included the experience of Companies over a long period of time, dating from the early years of the present century, and it is therefore thought to be of great importance that new tables should be compiled relating to the experience of the present generation. It is also generally felt that a table might now be constructed which would more satisfactorily exhibit the characteristics of mortality among assured lives, as influenced by initial selection and the subsequent duration of the policies.

The Council of the Institute of Actuaries and the Council of the Faculty of Actuaries will co-operate in this work.

It is earnestly desired that as many Companies as possible shall contribute their experience. At a later stage we shall have to communicate with you as to the means of defraying the expense of an undertaking so important to all Assurance Companies; but, independently of that question, our object at present is to secure material for the investigation. We shall esteem it a favour, therefore, if you will kindly submit the question to your Directors, and ascertain whether your Company will join in the investigation. It is proposed to obtain the experience for the period from 1863 to 1893 (including, of course, lives on the books in 1863, and new entrants since that date), and to confine it to lives accepted at the ordinary rate of premium. No doubt, when the materials have been received from the Companies, it will be found possible to carry out various subsidiary investigations.

The particulars which it will be very desirable to obtain regarding each Assured Life—and each Annuitant as far as applicable—are as follows:—

1. No. of Policy.
2. Sum Assured.
3. Description of Policy.
4. Profit or Non-profit.
5. Name of Life.
6. Occupation.
7. Date of Birth.
8. Date of Entry.
9. Date of Exit.
10. Mode of Exit.

Be good enough to say whether, in the event of your Company contributing its experience, these particulars can be supplied, or, if not, what is the nearest approach that can be given to them.

When it has been ascertained which Companies will contribute, a letter of detailed explanations will be issued, together with the forms of card which will be used.

We remain,

Yours faithfully,

AUGUSTUS HENDRIKS,  
*President of the Institute of Actuaries.*

JAMES MEIKLE,  
*President of the Faculty of Actuaries.*

(5.) In reply to this letter, 66 Companies expressed their willingness to contribute to the experience. In the list on pages vi and vii are given the names and dates of establishment of each contributing Company, the nature of the data furnished being indicated by an asterisk in the appropriate column. It will be seen that 60 Offices contributed to the experience of assured lives, and 43 to the experience of annuitants.

(6.) Instructions were issued to the Offices, in May and August 1894, as to the plan upon which it was desired that the data as to Assured Lives and Annuitants should be taken out and supplied. Copies of these instructions are given for Annuitants on pages 22 to 24, and for Assured Lives on pages 81 to 85 of the present volume. Some questions having subsequently arisen as to the interpretation of these instructions, a supplementary statement was issued to the Offices in April, 1895, dealing with these points of enquiry. A copy of this supplementary statement is given on page 86 of the present volume.

*Companies contributing through the Institute of Actuaries.*

Name of Company.	Estd.	Assurances.	Annuities.
Alliance ... ..	1824	*	—
Atlas ... ..	1808	*	—
British Empire Mutual ... ..	1847	*	*
Clergy Mutual ... ..	1829	*	—
Clerical, Medical and General ... ..	1824	*	—
Commercial Union... ..	1861	*	*
Eagle ... ..	1807	*	—
Economic ... ..	1823	*	—
English and Scottish Law † ... ..	1839	*	*
Equitable ... ..	1762	*	—
Equity and Law ... ..	1844	*	*
Friends' Provident ... ..	1832	*	*
General ... ..	1837	*	*
Gresham ... ..	1848	*	*
Guardian ... ..	1821	*	*
Hand-in-Hand ... ..	1696	*	*
Imperial and } ... ..	1820	*	*
England } ... ..	1840	*	*
Lancashire ... ..	1852	*	—
Law Life ... ..	1823	*	—
Law Union and Crown ... ..	1825	*	*
Legal and General ... ..	1836	*	*
Liverpool and London and Globe ... ..	1836	*	*
London and Lancashire ... ..	1862	*	—
London Assurance ... ..	1720	*	*
London Life Association ... ..	1806	*	—
Metropolitan ... ..	1835	*	—
Mutual ... ..	1834	*	—
National ... ..	1830	*	*
National of Ireland ... ..	1822	—	*
National Provident... ..	1835	*	*
North British and Mercantile † ... ..	1823	*	*
Norwich Union ... ..	1808	*	*
Patriotic ... ..	1824	*	—
Pelican ... ..	1797	*	—
Provident ... ..	1806	*	—
Provident Clerks' ... ..	1840	*	*
Prudential ... ..	1848	—	*
Rock ... ..	1806	*	—
Royal ... ..	1845	*	*
Royal Exchange ... ..	1720	*	*
Sun ... ..	1810	*	—
Union ... ..	1714	*	—
United Kent ... ..	1824	*	*
United Kingdom Temperance and General ... ..	1840	—	*
Universal ... ..	1834	*	—
University ... ..	1825	*	—
Westminster and General ... ..	1836	*	*
Yorkshire ... ..	1823	*	*

† These Companies contributed their English and Scottish business respectively through the Institute and the Faculty.



*The following American Offices contributed their British Annuity Experience only:—*

Name of Company.	Estd.	Assurances.	Annuities.
Equitable of the United States ... ..	1859	—	*
New York Life ... ..	1845	—	*
Mutual of New York ... ..	1843	—	*

*Companies Contributing through the Faculty of Actuaries.*

Name of Company.	Estd.	Assurances.	Annuities.
Caledonian ... ..	1805	*	*
City of Glasgow ... ..	1838	*	*
Edinburgh ... ..	1823	*	*
English and Scottish Law †	1839	*	*
Life Association of Scotland ... ..	1838	*	*
North British and Mercantile †	1823	*	*
Northern ... ..	1836	*	*
Scottish Amicable ... ..	1826	*	*
Scottish Equitable ... ..	1831	*	—
Scottish Imperial ... ..	1865	*	—
Scottish Life ... ..	1881	*	*
Scottish Metropolitan ... ..	1876	*	*
Scottish Provident ... ..	1837	*	*
Scottish Union and National ... ..	1824	*	*
Scottish Widows' Fund ... ..	1855	*	*
Standard ... ..	1825	*	*

† These Companies contributed their English and Scottish business respectively through the Institute and the Faculty.

(7). The cards required for the record of the data in respect of individual policies were furnished to the contributing Offices in December, 1894, and January, 1895. In the case of each English Office, a special number, and in the case of each Scottish Office, a distinctive letter, was printed at the foot of the cards, so that each Company was represented, so far as the general body of workers was concerned, by a symbol only. Specimens of the cards employed for the Annuitants are given in the present volume on page 34, and for Assured Lives on pages 56, 57.

(8). The completed cards relating to the Annuitant Experience were received from the contributing English and Scottish Offices towards the end of the year 1896, and those relating to Assured Lives were all sent in by March, 1897.

(9). The task of compilation and arrangement of the data was one of great magnitude and delicacy. By the courtesy of the

Institute of Actuaries, the Hall and Class Rooms of Staple Inn were placed at the disposal of the Committee, and a staff of clerks, varying in number from six to thirty-five, was employed daily, from July, 1896, to August, 1900, in arranging and tabulating the cards on which the data were supplied. This staff was under the honorary supervision of Mr. THOMAS G. ACKLAND, F.I.A., and it is due to his unwearied attention to details, and his unfailing skill in statistical processes, that the work has been brought to a successful issue.

(10). The elimination of duplicates, and the settlement of the numerous inevitable queries, being disposed of, the work of tabulation was finally completed in August, 1900, and the volumes showing the unadjusted data were published in the following order:—

- (1). Life Annuity—Male and Female. (January, 1899).
- (2). Endowment Assurances, and Minor Classes of Assurance—Male and Female. The Minor Classes comprise Whole Life Assurances with limited payments, and with ascending premiums; Joint Life Assurances; Contingent Survivorship Assurances; and Temporary Assurances. (January, 1900).
- (3). Whole Life Assurances—Male Lives—Participating and Non-Participating. (July, 1900).
- (4). Whole Life Assurances—Female Lives—Participating and Non-Participating. (November, 1900).

A general summary of the data included in the whole experience comprised in these four volumes is given on page xii.

(11). The principles and methods followed in the compilation of the data in the different sections of the experience are set out in detail on pages 1 to 120 of the present volume, by Mr. T. G. ACKLAND, the Hon. Supervisor of the work.

(12). The Committee consider themselves singularly fortunate in having been able to place the work of graduation in the hands of Mr. G. F. HARDY, F.I.A. Readers of this volume, and those who make use of the Tables, will need no reminder of the pre-eminent position which Mr. HARDY occupies in connection with the subject of graduation, but the Committee desire here to place on record their high appreciation of the manner in which he has placed his unrivalled skill and knowledge at their disposal. An account of the principles and methods adopted is given by him on pages 121 to 166 of the present volume.

(13.) The computation of the elementary mortality values for Life Annuitants, and the mortality and monetary tables for Assured Lives, was undertaken by Mr. H. J. BAKER, F.I.A., with the assistance of a competent London Staff. The monetary tables in respect of Life Annuitants for single and joint lives were computed in Edinburgh under the honorary supervision of Mr. JAMES CHATHAM, F.I.A., F.F.A. Accounts of the methods followed in the calculations (so far as these are not upon lines generally followed) have been prepared by Mr. BAKER and Mr. CHATHAM, and will be found on pages 167 to 176, and pages 177 to 185 of the present volume respectively.

(14.) The three volumes setting forth the graduated tables and the monetary values were published at the dates specified :—

BRITISH OFFICES LIFE ANNUITY TABLES :—

- (1) Select Tables, Male Lives— $O^{asm}$ —, Female Lives— $O^{af}$ —,  
(December, 1902).

BRITISH OFFICES LIFE TABLES :—

Whole Life Participating Assurances—Males.

- (2) Aggregate Tables— $O^m$ —, and Aggregate Tables  
excluding the first 5 years— $O^{m5}$ —,(May, 1902).  
(3) Select Tables— $O^{sm}$ —,(June, 1903).

(15.) The Committee recognise that the tables included in these published volumes represent a portion only of those which might usefully be computed to meet fully the practical needs of the profession. It is hoped, however, that the Tables published under their authority will be found to furnish an important contribution towards those needs; and that they may, from time to time, be supplemented by the skilled labours of individual members (and especially of the younger members) of the profession.

(16.) It was felt that, for the convenience of the profession, and generally of those who employ, or have occasion to cite the published Tables, it was desirable to adopt an authoritative set of official designations and symbols applicable to the new Experience, which is printed on page xi.

(17.) It is hardly necessary to say that a work of this magnitude, requiring, for a great part of the time, the employment of a numerous staff, involved a very considerable outlay. The Committee thankfully recognise the liberal response which has been made by the Life Assurance Companies to their appeal for the necessary funds.