

ARTICLES OF ACTUARIAL INTEREST

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THE POPULATION INVESTIGATION COMMITTEE

Population Studies

Vol. IV, No. 4, March 1951

BROWN, S. P. *Analysis of a hypothetical stationary population by family units*, pp. 380-394.

This study describes the construction of a hypothetical stationary population intended to serve as a model family distribution and to provide material for use in long-term assessments of housing requirements. The model shows the general pattern of population distribution that would ultimately be reached if the recent experience of mortality, frequency and age-incidence of marriage, family-size distribution, and other similar factors were to continue unchanged, and if births were to occur in the numbers required to maintain the population at a constant level.

The basic population of 100,000 persons is divided into age-groups by sex and marital status. For married women, widows and widowers, the numbers with 0, 1, 2, 3, 4 and 5 or more unmarried children under age 25 are given for groups of attained ages (with, for married women, a further analysis by duration of marriage). From these analyses the number of 'family units' in the population can be found and their constitution by number of persons, sex, marital status and age.

The practical application of these hypothetical life, nuptiality and fertility tables in drafting housing programmes is illustrated in the succeeding article (in the same number of *Population Studies*, by Ruth Glass and F. G. Davidson), in which the biological families are converted into households of various types and sizes, and are classified by selected criteria as growing, stationary or declining households according to their chance of further family expansion.

Vol. V, No. 2, November 1951

COX, P. R. *Studies in the recent marriage and fertility data of England and Wales*, pp. 132-152.

This paper, produced by the Demographic Study Group of the Institute of Actuaries Students' Society, tries to set forth the available data so as to illustrate the recent demographic history of this country and to

- (1) compare the first-marriage rates of each sex, age by age, by calendar years or by generations,
- (2) study the variations in the sexes' marriage rates in connexion with changes in the relative numbers of men and women available for marriage,

- (3) present fertility statistics in 'generation' form either according to the mother's age or according to duration of marriage,
- (4) examine the fertility experience of the marriages of 1939, 1940 and other years in the light of current theories about the effect of sudden changes in the numbers and age-distribution of marriages.

A shorter version of the paper appeared in *J.S.S.* x, 261.

ROYAL STATISTICAL SOCIETY

Journal

Vol. CXIV, Part 3, 1951

MARTIN, W. J. *A comparison of the trends of male and female mortality.*

Dr Martin examines the relationship between male and female mortality and analyses the mortality sex-ratios by cause of death, age-groups, regions and social class. The data are tabulated in quinquennia from 1841, ending a few years ago.

He shows that the disparity has increased fairly steadily for every age-group since the earliest years examined, though the increase is less marked in the youngest and oldest. Further, it tends to increase with age over the greater part of life, but to diminish at the most advanced ages. Analysis by cause of death, however, shows a wide variation; for some causes, such as 'rheumatism, nutrition, etc.', the female death-rate is higher at all ages, while for 'cancer and tumours' the female death-rate is higher than the male at the younger and lower at the older ages. The paper does not claim to have explained the reason for the disparity or for its trend.

In the discussion, in which several actuaries took part, it was mentioned that the superior vitality of women holds, in general, throughout the world, though with marked exceptions at certain ages in some countries. Life tables compiled for animals and insects show similar characteristics though with some exceptions.

SCOTT, A. D. *Bibliography of applications of mathematical statistics to economics, 1943-1949.*

A bibliography of nearly six hundred books and papers classified both by the statistical technique used and the nature of the economic data treated.

Vol. CXIV, Part 4, 1951

NATIONAL PHYSICAL LABORATORY. *Recent Advances in Mathematical Statistics. Bibliography, 1943-1947.*

A continuation of that published in *J.R.S.S.* CIX, part 4, 1946, for the years 1940-42; it covers more than two thousand books and papers dealing 'with the development of some aspect of statistical theory, or the application of statistical method to practical problems'.

The main sections are

- (a) Biographical and general,
- (b) Theory (including mathematical methods, probability and sampling),
- (c) Applications (to human and animal populations, medical statistics and epidemiology, genetics, psychology, industry, etc.).

INSTITUTE OF CHARTERED ACCOUNTANTS

Accountant, Vol. CXXV, Nos. 4016 and 4017, December 1951FINN, H. P. *Some reflections on industrial profits.*

This paper was delivered on 11 September 1951 at the summer course of the Institute of Chartered Accountants in England and Wales.

The author considers the matter under three headings:

- (i) problems connected with the ascertainment of profit for different purposes and the limitations which are inherent in profit statements in common with other accounting statements;
- (ii) the notions of reasonable profits and excessive profits;
- (iii) the taxation of profits.

In connexion with the controversial question whether current profits should be shown after charging depreciation of assets calculated to provide, at the end of their useful lives, their estimated replacement cost rather than their original cost, the author considers that it is unwise to lay down any hard and fast rules. Profit and loss accounts are domestic documents and they should represent the best attempt the directors can make to bring before their shareholders a 'true and fair view' of the state of affairs of the company and of the profit or loss for the year.

On the other hand, under heading (ii) he points out that in testing the 'reasonableness' of profits by relating them to capital employed in earning profits, unfairness or misunderstanding is likely to arise, particularly as between different businesses, unless the capital employed is measured on the basis of replacing the invested net capital assets at current price levels.

Under heading (iii) the author notes that if the taxation of profits is heavy some companies might be unable to continue in business, at its existing scale of activity, without new capital. He considers that the problem is essentially a political one—and accountants can do little more than point out the inevitable effect.

COWLES COMMISSION FOR RESEARCH IN ECONOMICS

*19th Annual Report, 1950-51*UNIVERSITY OF CHICAGO. *Rational decision-making and economic behaviour.*

The Cowles Commission, which is affiliated to the Econometric Society and the University of Chicago, exists for 'the conduct and encouragement of research in economics, finance, commerce, industry and technology, including problems of the organization of these activities, and of society in general. Its approach is to encourage and extend the use of logical, mathematical and statistical methods of analysis.'

The *Report* gives general information about the work of the Commission and short summaries of research carried out during the past year with lists of papers. A great part of the work referred to covers the application of probability methods to problems of economic behaviour, particularly in the fields of risk and uncertainty.

Mind, January 1952

REES, E. H. *Probability-sentences.*

A probability-sentence is defined as a declarative sentence in which the term 'probability' or one of its derivatives occurs. These sentences are classified by the author, who considers that there are two standard forms in normal use: the inductive sentence which predicts the future occurrence of a single or many events, and the frequency sentence which describes the actual occurrence of an event within a finite or infinite collective of similar events.

The paper is concerned mainly with a logical analysis of these two kinds of sentences. A probability-sentence of the pure frequency kind is descriptive, factual and completely verifiable by experience in the same sense as any factual sentence is verifiable. However, in practice this type of sentence is often associated with an inductive hypothesis which changes its character.

An inductive probability-sentence is a relation between a hypothesis and the evidence, and it is analytic; that is to say the probability-sentence in itself gives no new knowledge about the 'world'. The hypothesis and evidence are statements about the 'world'; if the hypothesis is confirmed on the evidence it does represent new knowledge, and this confirmation is expressed by the inductive probability-sentence.

The content of the probability-sentence is usually vague in ordinary language as, for example, in the statement, 'it will probably rain tomorrow'. However, attempts have been made to construct systems in which the probability or degree of confirmation is precisely defined and perhaps measurable.

This paper is recommended to those interested in the foundations of probability theory.

Economica, Vol. XIX, No. 73, February 1952

RIX, MARGARET. *The value of bonus issues.*

Miss Rix examines in detail the effects of the issue of 'bonus shares' and discusses the views of the various protagonists in the controversy as to the value of such issues.

BRITISH MEDICAL ASSOCIATION

British Journal of Social Medicine, Vol. VI, No. 1, January 1952

STEIN, L. *Tuberculosis and the 'Social Complex' in Glasgow.*

This paper describes the methods used in, and results of, a multiple regression analysis of various social factors constituting what is termed the 'social complex', which influenced tuberculosis mortality in the wards of Glasgow over the years 1930-47. It shows that these factors contribute widely differing amounts to the extraordinarily high proportion (namely, 80%) of 'explained' variance; overcrowding (persons per room) and ordinary crowding (persons per house) are the most important factors, and together account for 60-70% of the variance, while poverty and unemployment contribute only about 5-15%.

The conclusion is reached that the 'social complex' cannot be adequately depicted by a single social index, but that the major factors in its association with respiratory tuberculosis in Glasgow are density of dwelling occupation and additional overcrowding, which play a significant part in the cases of this disease in the crowded wards of the city and the excess deaths from it. It should be noted that the Glasgow trends have diverged from those of towns in England and Wales and of most cities in Scotland.

British Medical Journal, No. 4757, March 1952

MORRIS, J. N., HEADY, J. A. and BARLEY, R. G. *Coronary Heart Disease in Medical Practitioners.*

This paper is of interest for the light which it throws on coronary heart disease, and the methods used (which include the Life Table technique) to deal with the data. The investigation covers the experience of the disease from 1947-50 among a group of medical practitioners with permanent policies providing sickness benefit from the commencement of incapacity.

The population is investigated according to age in the following three ways:

- (i) the annual rate of new cases;
- (ii) (a) the proportion of the population who are incapacitated from work because of the disease during a specified period of time, whether the attack is a new one or not,
(b) the proportion of the population who have been incapacitated from work because of the disease in an earlier period, have returned to work and are not incapacitated during the specified period;
- (iii) the history of the members of the population who are attacked.