ARTICLES, PAPERS AND PUBLICATIONS OF ACTUARIAL INTEREST


OPERATIONS RESEARCH, Vol. 22, No. 1, January–February 1974

ELLWEIN, L. B. *A Flexible Enumeration Scheme for Zero-One Programming.*
This article presents a method of searching for the global optimum of a zero-one programming problem. The method, it is claimed, requires less storage than the normal branch-and-bound approach, without loss of flexibility in the search procedure. The method requires enumeration constraints to be constructed to prevent the possibility of cycling to a node which has previously been calculated.

OPERATIONAL RESEARCH QUARTERLY, 24, No. 4, December 1973

EASINGWOOD, C. *A Heuristic Approach to Selecting Sales Regions and Territories.*
The usual methods of selecting sales regions often result in unequal allocation of work load between salesmen and between area sales managers. This paper describes a method by which the managers themselves can try out different allocations of areas to select the most even distribution of work. The author argues that if a method is easy to understand, and is under the control of the management, it is most likely to lead to useful results. In this case, the analysis was used for a reorganization which was followed by increased sales and reduced staff turnover.

OPERATIONAL RESEARCH QUARTERLY, 25, No. 1, March 1974

The types of models considered in this paper are deterministic models with given sets of parameters, similar models which incorporate stochastic parameters and models which include mathematical programming or optimizing. All these models can be used to evaluate alternative strategies in corporate planning either by testing specific proposals or by evaluating the ‘best’ strategy under various assumptions.

The models of three firms (one a large financial institution) are assessed in terms of their general and staffing effects, their type, structure and other technical aspects, and their applications, level of acceptance by management, difficulties and conditions affecting success.

These assessments are compared with case histories reported in the literature and other surveys. The conclusions, especially those relating to the conditions for success, are of general interest.


A presentation of some of the methods used to organize and analyse the 1971 Census.

*Security of the Census—report by nominees of the Royal Statistical Society.*
The Government invited the Royal Statistical to study the security of information in the 1971 Census. The Society nominated Professor G. A. Barnard, Professor P. G. Moore and Dr. J. A. Nelder to do this. Their report is published here, together with the Government’s comments on it.
Articles, Papers and Publications of Actuarial Interest

APPLIED STATISTICS, 22, 3, 1973

PRENTICE, R. L. AND EL-SHARAAWI, A. A model for Mortality Rates and a Test of Fit for the Gompertz Force of Mortality.
A method is given for testing the fit of the Gompertz formula to a mortality table by weighted linear regression and marginal likelihood. Numerical examples are shown.

CUNNINGHAM, S. W. The predictability of British Stock Market Prices.
It is shown that stock market prices behave in a slightly non-random manner. This non-randomness could be used to advantage in timing new investments.

REPORT OF THE COMMITTEE TO REVIEW NATIONAL SAVINGS, Chairman: Sir Harry Page
The various forms of National Savings are critically examined. It is recommended that the trustee savings banks should be developed as banking organizations similar to the clearing banks except that they will be mutual and not profit making. The National Savings Bank (Post Office accounts), on the other hand, should continue with its more limited services along much the same lines as at present. It is proposed that all National Savings Treasury Securities, except Premium Bonds, should be withdrawn and replaced by a new security which would combine most of the features of the National Savings Certificate and some elements of the British Savings Bond.

A section on inflation-proofing shows that the real return on most National Savings Certificates purchased since 1951 would, if those certificates had been cashed in 1972, have been negative and the Committee are strongly disposed to recommend the issuing of a modest index-linked bond for the small saver.

To set the subject in its context the last chapter deals with other financial institutions. This includes a description of life assurance and pension funds which it is thought do not offer a complete substitute for National Savings since they provide for long-term savings and future contingencies.

THE LAW COMMISSION REPORT ON PERSONAL INJURY LITIGATION—ASSESSMENT OF DAMAGES

Section (F) on the method of assessment of pecuniary loss states the case in favour of actuarial evidence rather than using the 'multiplier' approach. The problem of allowing for inflation is also considered. The report recommends legislation to promote the use of actuarial evidence and the setting up of a technical committee comprising actuaries, lawyers and economists to compile a set of official actuarial tables which could include, if this proves feasible, a factor to allow for inflation.

PUBLIC RECORD OFFICE HANDBOOKS No. 14. RECORDS OF INTEREST TO SOCIAL SCIENTISTS 1919 TO 1939. INTRODUCTION
This guide gives notes for each government department on the papers available for public inspection.

CENSUS 1971. SCOTTISH POPULATION SUMMARY
The principal table contains figures on enumerated persons, economic activity by sex, private households and population by sex, for Scotland and various constituent regions.

NATIONAL INSURANCE BILL 1974. REPORT BY THE GOVERNMENT ACTUARY ON THE FINANCIAL PROVISIONS OF THE BILL. (Cmnd. 5587)
This deals with the financial effect of increasing the standard rate of pension to £10 a week and the standard rate of sickness and unemployment benefit to £8.60 a week for single persons, with corresponding increases in other rates, and the associated changes in contributions. The income and outgo of the National Insurance and Industrial Injuries Funds is given for 1974–
75 using illustrative assumptions for future earnings increases (12½% per annum from April 1974) and the number of unemployed.

An indication is given of the likely shortfall in income in 1975–76 on the basis of the benefits proposed by the Bill and the contribution rates provided for by the Social Security Act 1973.

SOCIAL TRENDS No. 4, 1973
This issue contains an article on the elderly by D. C. L. Wroe of the Central Statistical Office which brings together information from a number of sources. It deals with demographic aspects, incomes and allowances, employment, health and public expenditure. The section of this volume of Social Trends which deals with population contains a short article on variant population projections and new tables are included giving age specific fertility rates by cohorts and information on migrant flows. The section on health and personal social services contains new tables on morbidity (long-standing illness and restricted activity), rates of sickness by cause and age and mortality by social class (chart).

NATIONAL WESTMINSTER BANK REVIEW, February 1974
In this sequel to an earlier article by the same authors they suggest that the two objectives of the tax credit scheme—the simplification of the system of personal tax collection and the improvement of the system of income support for poor people may be incompatible. The major portion of the amount distributed would go to the non-poor and only about one-third of those regularly receiving supplementary benefit would have their incomes raised sufficiently to make receipt of this benefit unnecessary. The reasons for this state of affairs are that the proposed scheme would only apply to those with earnings of at least £9 per week or in receipt of retirement pensions or other national insurance benefits, and that there will, in general, be only one level of tax and one level of credit for a given size of family. It is suggested that these features are not necessary consequences of a tax credit scheme and that further study should be given to the possibility of changes which would make the scheme more effective for the relief of poverty.

The article concludes with comments on two specific aspects of the scheme—the payment of tax credits for children to the mother and the treatment of married women’s earnings.

THE THREE BANKS REVIEW, March 1974
BARR, NICHOLAS AND ROPER, JOHN. Tax Credits: an Optimistic Appraisal.
This article examines in some detail the criticisms which have been made of the proposed tax credit scheme that it does little to redistribute income and that it lacks flexibility in that it requires a single rate of tax for the vast majority of taxpayers. It concludes that these criticisms have at the very least been overstated, and that the scheme can be suitably modified to overcome them. On redistribution, it is pointed out that at least the tax credit scheme will help some who would not be helped by an increase in personal allowances as they are below the tax threshold. Nevertheless, it is suggested that redistribution can be better achieved through income related benefits and that the tax credit mechanism can be used to bring take-up rates for these benefits close to 100% if the coverage of the tax credit scheme can be made complete, by covering the self-employed and those on low incomes. Although this would present formidable administrative problems, it is thought to be not only possible, but also necessary within a comparatively short time of the scheme’s introduction. On the question of flexibility, it is pointed out that a tax which starts at a comparatively high point with a high rate is progressive when applied to total income; an increase in the marginal tax rates on low incomes coupled with an increase in the tax threshold or tax credit will unambiguously benefit the poorest families. At high levels many methods can be adopted to make the tax system more flexible and progressive, and
the article gives some examples. It is concluded that the criticism of lack of flexibility lacks substance.

**BRITISH TAX REVIEW, November–December 1973**

**King, A. L., The Impact of Inflation on Income Tax liability.**
This article endeavours to trace the effects of 'fiscal drag' over a 12-year period, from the tax year 1961–62 to the tax year 1973–74. It proceeds by calculating the tax payable in 1961–62 on certain specimen incomes, increasing these incomes by 80% to allow for the changes in the retail price index over the period calculating the tax payable in 1973–74 on these increased incomes, and comparing the results with the tax payable in 1961–62 increased by 80%. The difference between the two figures represents the extent to which changes in the scales of taxation have allowed for inflation. The conclusion is drawn that for 1961–62 salaries of £3,000 or thereabouts and £20,000 or thereabouts, taxpayers are paying proportionately about the same amount of tax, for salaries between these figures the burden is higher and for higher salaries the tax burden is less. The article then demonstrates the effect of fiscal drag between 1973–74 and 1974–75 assuming no change in tax rates or allowances but an inflationary increase of 15% in salaries—these figures are, of course, hypothetical—and asks for the effects of fiscal drag to be made clearer in Government statements—in particular, in the traditional tables annexed to the Financial Statement and Budget Report headed 'Tax on Specimen Incomes'.

**BRITISH TAX REVIEW, November–December 1973**

**Likierman, Margaret, Settled Life Policies Again.**
This article is divided into three parts. The first attempts to answer the question: What is the precise relationship between the substituted section 2(l)(b)(iv) of the Finance Act 1896 and the nature of the beneficiaries’ interests? In the second part it considers the effect of the general rules about intermediate income on future interests under English law, and the final part looks at some recent actual decisions which are relevant.

**THE BANKER, April 1974**

**Scott, Maurice, A New Way to Attack Inflation.**
There are two conventional ways of attempting to counter inflation—by reducing demand and so increasing unemployment, or by price control and incomes policy. However effective either of these might be, given sufficient determination on the part of government and sufficient acceptance by the general population, in fact governments have not felt able to push either of them sufficiently to stop inflation, or even, in recent years, to prevent its acceleration.

This article describes an alternative scheme, as follows. If in any year wage and salary costs per unit of output are growing, then employers are instructed to deduct an increasing percentage from all wages and salaries, and to retain the amounts deducted; if, for example, the rate of increase of wage and salary costs per unit of output were 12% in any year, 1% would be deducted in month 1, 2% in month 2 and so on; if an error were made in determining the rate of increase, it would be possible to make subsequent corrections. Advantages claimed for the scheme are that it is administratively straightforward and does not interfere with systems used to determine relative wages and salaries.

The problems of implementing the scheme, and some likely objections to it, are considered.

**OXFORD BULLETIN OF ECONOMICS AND STATISTICS, November 1973**

**Buijn, A. D. and Evans, J. D. E. Price Formation and Profits: Explanatory and Forecasting Models of Manufacturing Industry Profits in the U.K.**
This paper describes a model, compatible with the official national income forecasting
procedures employed by the government, for forecasting company profits in the U.K. The assumption is that prices are determined in relation to some target level of output, to give at that level some specific share of value added as profit. The problems of estimation of costs are discussed, including those caused by prices and incomes policy, and profits forecasts are made for manufacturing industry up to the end of 1974. Finally, the accuracy of this and various other forecasting methods are evaluated.

THE THREE BANKS REVIEW, September 1973

WILLIAMS, GARETH. Graduates and the Labour Market
The author of this article, who is a member of the Higher Education Research Unit at the London School of Economics, examines the pattern of graduate employment in recent years, based largely on the annual statistics published by the University Grants Committee on First Employment of University Graduates and some further information on starting salaries of graduates of Leeds University. Conclusions are that the available evidence suggests that the graduate employment market is working in the way that economic theory predicts; when the number of graduates coming onto the labour market rises more rapidly than the demand for graduates, this is accompanied by a relative decline in the salaries of graduates but that this has not occurred rapidly enough to prevent graduate unemployment from increasing, and also that the decline in the relative economic attractiveness of a degree has been accompanied by a reduction in the trend rate of increase in the demand for higher education. Other points which are brought out are that starting salaries of those with Master's degrees are not much larger than of those with first degrees only, but that Ph.D's do command appreciably higher starting salaries, and that the claims sometimes made that graduates reject the materialistic ethic of industry and commerce may not be altogether justified, as public sector employment starting salaries are fully comparable with those in the private sector.

POPULATION, Vol. 29, No. 1

International comparisons indicate that the differences in premarital conceptions between North and South Europe are decreasing. Births in the first year of marriage have two maxima (around 5 and 9–10 months after marriage), the latter also diminishing with postponement of the first child.

BIRABEN, J.-N. AND DUHOURCAU, F. La mesure de la population dans l'espace.
A synthesis of spatial relationship concepts and measurements of concentration: Gini's index, house clustering, spatial frequencies and centrographic measures (especially 'population potential') are discussed.

MORTALITY TRENDS: AGE, COLOR AND SEX, UNITED STATES, 1950–69
(Department of Health, Education and Welfare, Series 20, No. 15)
An analysis of changes in the components of the steady crude death rate, including rising mortality rates among those aged 15–24 and falling rates at ages over 45. Male mortality at ages 20–24 was over three times that of females of similar ages: non-white mortality relative to white mortality improved among females but not among males.

AUSTRALIAN LIFE TABLES, 1965–67. PREPARED BY THE COMMONWEALTH ACTUARY
(Commonwealth Bureau of Census and Statistics, Canberra)
These life tables were prepared on similar lines to the English Life Tables, incorporating 3 years' deaths around a central census of population. Full-blooded Aborigines were included for the first time, but extracts from a life table excluding them is given for comparison with previous tables. Spencer's 21-term formula was found to be inadequate on this occasion, so
in a graphic graduation was blended into it at younger ages and the formula \( m_x = a + bc^x \) applied at advanced ages. Derivation of \( q_x \) and \( \mu_x \) were on familiar E.L.T. 12 lines. Mortality had not improved among young adults (due mainly to accidents) nor among the middle-aged (respiratory and circulatory diseases): only children and the aged (males over 88, females over 72) showed improved vitality.