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AN ECONOMIC LAW OF LIFE

by Geoffrey N. Calvert

It is now almost 120 years since Makeham extended Gompertz's efforts to find a simple mathematical law which would reflect the mortality experience of a group of lives and also simplify the calculation of monetary values. Since 1860, the resulting Makeham's Law ($\mu_x = A + Bc^x$) and its derivatives have stood the test of time very well, while four generations of actuarial students have tended to gather the impression that there may in fact be some mathematical law at work which in some way determines the rate of increase in mortality on a basis directly related to age.

A radically different approach was recently suggested from an unexpected quarter. In a little-known but highly

significant 1976 study, Kohler and Alcock of the Canadian Peace Research Institute have proposed an "Economic Law of Life."⁽¹⁾ Drawing from 1965 statistics for 136 countries, they show a remarkable correlation between gross national income per capita, and expectation of life. This is illustrated in the accompanying chart.

Until a certain level of affluence is reached, similar to that already attained 15 years ago in the developed countries, life expectancy responds sensitively to improvements in economic conditions. After that point is reached, there is little more in the way of longevity to be gained from further increases in prosperity.

⁽¹⁾ Journal of Peace Research, Vol. XIII/1976
Canadian Peace Research Institute, Oakville, Ontario

Pursuing their research both through *time periods* and into per capita *energy consumption* by country, the authors concluded that among poorer nations:

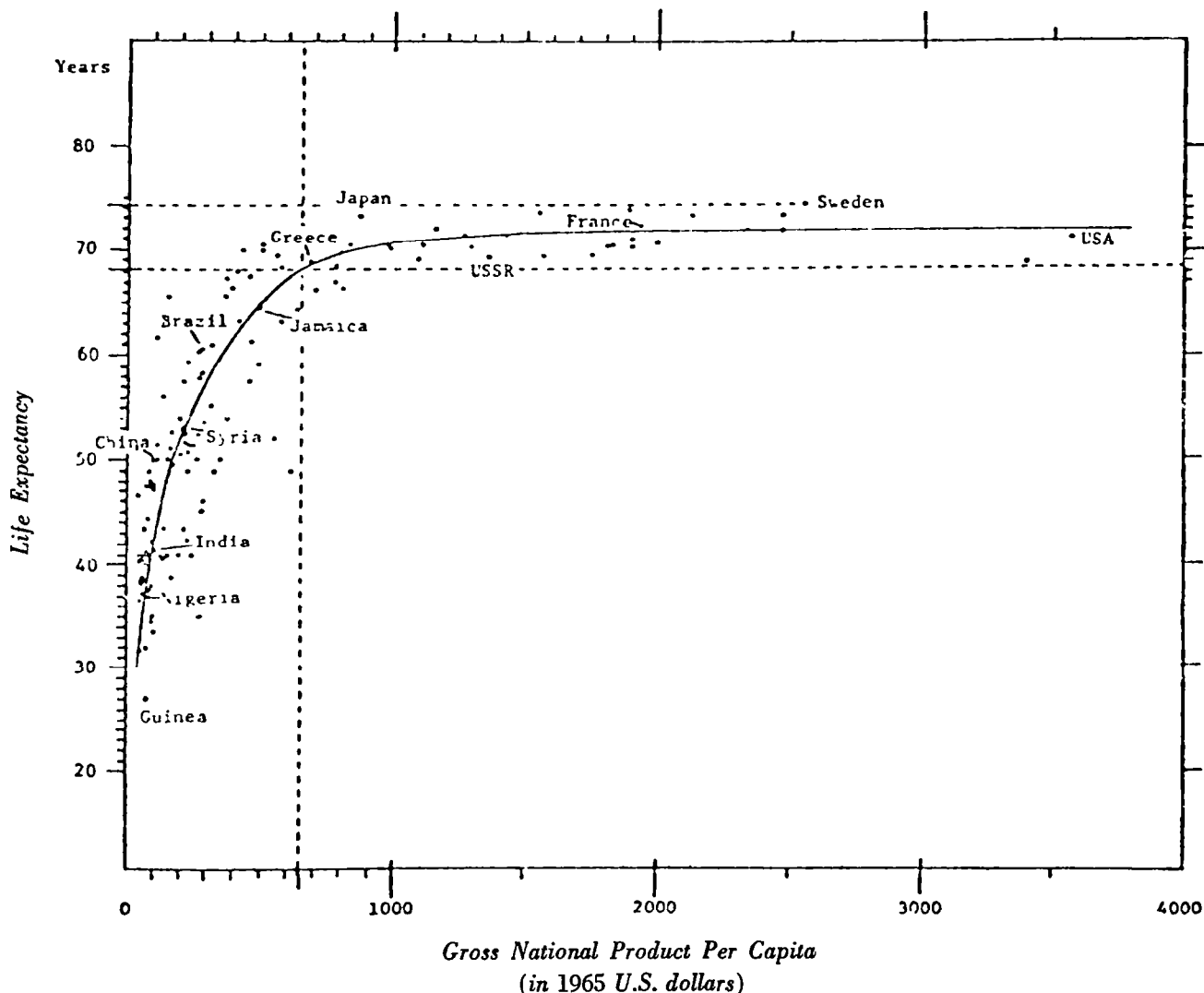
- Every increase of 7.7% in GNP per capita will increase average life expectancy by one year;
- Every increase of 7.2% in energy consumption per capita will increase average life expectancy by one year.

If we pursue this approach further, many possibilities suggest themselves. Just to start the discussion, here are some stimulating examples:

(a) A significant change in the level of affluence (or energy availability) within a relatively short time (such as 10 years) would tend to twist the curve of mortality upward or downward, re-

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Year: 1965 Linear Scale



Sources, for G/P: Taylor and Hudson, *World Handbook*, (1972), pp. 316-320, Table 5.5 for E: U.N., *Demographic Yearbook* 1973, pp. 94-100, Table 3, E at birth. Male-female average.

Economic Law of Life

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ardless of Makeham's hypothesis.

(b) If we were to stratify a population into classes according to relative present affluence or poverty, we would come up with a whole family of mortality curves and their derivatives. (This appears to be consistent with present known facts about life expectancies among minority groups).

(c) Weighty political arguments appear to be latent in this approach, justifying our transfer payment systems aimed to eliminate poverty.

(d) The same argument could conceivably be carried into the international sphere. For example, by restricting energy supplies and bringing on oil-induced economic depression in third world countries, the OPEC nations may have much to answer for in terms of human life.

(e) In so far as a reduction in family size raises the economic prosperity of today's potential parents, it will also lengthen their lives and hence raise the value of their expected Social Security benefits. Since the Social Security system is not funded, these enlarged benefits must be provided by the (shrunk) population of the next generation of workers, not only forcing up taxes even more than is presently being projected, but also lowering the incomes and hence tending to shorten the lives of our successors! (This argument may be muted a bit if they are still comfortably within the levels of income where changes don't have much effect).

(f) The work of actuaries in designing and servicing life insurance, pension plans, and social security systems of various kinds, results not only in providing economic assistance when it is needed, but also in providing life itself!

The connection between funding pension promises, the provision of vitally needed capital formation, improvements in productivity, the conquest of inflation, and hence the actual discharge of the pension promise, has only recently begun to be recognized. In this proposed "economic law of life", we have something else to weave into the tapestry of our discussions. In this decade, actuarial science and economic realities seem to be drawing much closer together, and indeed are becoming closely interwoven. □

ACTUCROSTICS

As a gift from our Competition Editor, two more Actucrostics accompany this issue. The reception our readers gave to the first two of these easily justifies saying that they are brought back by popular demand. But Shelley was right in his "with some pain is fraught" observation; we can't help wishing that articles bearing on weighty professional problems would make as obvious an impression.

Solutions will be printed in our April issue.

NONAGENARIAN FELLOWS

by E. J. Moorhead

The death of John S. Thompson shortly after his 95th birthday, reported in our January issue, caused us to wonder whether he was the oldest Fellow whose death is recorded in the *Transactions*. We were curious also to see how many Fellows through the years had passed the age 96 milestone made so significant by having been chosen as the terminal age of the American Experience Table.

It appears that the oldest deceased Fellow was Solomon A. Joffe, born May 11, 1868, died November 8, 1964, three days before age 96½. His case is of rather special interest because he wrote two papers for the *Transactions* dealing with the origin and construction of the famous mortality table whose end-point he was destined to reach.

William Oscar Morris (died April 1, 1978) may have lived slightly longer than Mr. Joffe, but Mr. Morris's obituary does not give his exact birth date in 1881. No Fellows except those two have died beyond age 96.

The oldest Canadian Fellow at death seems to have been Coll Claude Sinclair who died October 21, 1975 at the age of 93. □

What Makes Robert J. Myers Run

"In retrospect, Myers appears as a truly singular figure. No other chief actuary (of the Social Security Administration) approached him in combining technical talent with a taste for the political milieu."

Martha Derthick, *Policymaking for Social Security*, p. 395 fn.

This book will be reviewed in an early issue. □

Social Security

Bruce Schobel and Sam Weissman, *Termination Experience of Disabled-Child Benefits Under the Old-Age, Survivors, and Disability Insurance (OASDI) Program*. Actuarial Note No. 98, Social Security Administration, Baltimore, Maryland, November 1979, pp. 13.

The Social Security Act, as amended in 1956 and 1958, provides for monthly benefits to disabled children of retired, disabled, and deceased insured workers. These benefits are currently payable to children age 18 and over who become disabled before age 22, but not necessarily after passage of the applicable law. Actuarial Note 46 (September 1968) presented a study of disabled-child benefit termination rates based on experience in 1962-65. This note presents data on similar experience in 1975-76 and compares the termination rates experienced in the two periods.

History of the Provisions of Old-Age, Survivors, Disability, and Health Insurance 1935-1979. Social Security Administration, Baltimore, MD, January 1980, pp. 15.

This booklet presents in tabular form a short history of the system from its beginning through the changes made in 1979. Included are sections on covered employment, requirements for becoming insured, benefit calculations, beneficiary categories, and financing provisions. Also included are average annual earnings 1951-1978 and the benefit formula bend-points and other factors derived therefrom.

Harry J. Kingerski, *Projecting OASDI Long-Range Program Cost As A Percentage of Gross National Product*. Actuarial Note No. 99, Social Security Administration, Baltimore, MD, January 1980, pp. 8.

Projected OASDI expenditures are usually expressed as percentages of taxable payroll. This Note presents them as percentages of Gross National Product and of taxable payroll, compares the two, and gives a method for converting from the one to the other. Factors in the conversion and implications of this new measure are discussed.

Copies of these items may be obtained free from the Office of the Actuary, Social Security Administration, Baltimore, MD 21235. □