



SOCIETY OF ACTUARIES

Article from:

# The Actuary

October 1976 – Volume 10, No. 8



# The Actuary

The Newsletter of the Society of Actuaries

VOLUME 10, No. 8

OCTOBER, 1976

## ARBOR VITAE?

by Frederic Seltzer

A discriminating cluster of actuaries distributed throughout the United States and Canada with an outlier from England gathered together from September 2 to September 4 at the University of Michigan, Ann Arbor, for the Eleventh Annual Actuarial Research Conference.

Crowded together in the front rows of an auditorium in the Modern Languages' Building, William A. Ericson, Chairman of the Department of Statistics, welcomed the conferees. John A. Hartigan of Yale University led off with an overview of significant papers in the historical development of clustering. After queuing for coffee and doughnuts, he continued with a fascinating exposition of clustering algorithms finally leading us through the forest of "k means" and "single linkage" to the "minimum spanning tree." Phelm P. Boyle from the University of British Columbia closed the morning by taking us over the "Black-Scholes" of European call options into the absorbing barrier of the Cox Family by applying stochastic processes to financial problems. Our appetites whetted, we proceeded to lunch at the Michigan League.

Aa robustt add hogg talkk by Robert V. Hogg off thee University off Iowaa onn discriminationn functionss openedd thee afternoonn sessionn andd endedd withh aa revieww off rankk approachess. Bob was followed by William H. Du Mouchel of the University of Michigan. He reported on his findings with a data set supplied by LIMRA using logit regression compared with discriminant analysis and ordinary least squares. Carol C. Shall of Peat, Marwick, Mitchell and Co. closed the session with a practical example of using discriminant

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## THE 1976 OASDI TRUSTEES REPORT LOOKS AT THE FUTURE

by E. J. Moorhead

*The "1976 Annual Reports of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds, of the Federal Hospital and Insurance Trust Fund, and of the Federal Supplementary Medical Insurance Trust Fund" will be reviewed in the Transactions.*

The annual Social Security Trustees Reports — heavily the product of the Office of The Actuary — contains much of interest and value to actuaries who practice outside the realm of social insurance. The OASDI estimates cover an exceptionally long period (75 years) and employ economic and demographic factors that are of significance in non-governmental insurance and pensions. This article is not a review of the 1976 OASDI Report; it is a description with comments of some of these economic and demographic forecasts.

### Estimates Of Growth In National Average Wages and In The Consumer Price Index

The following table shows the historical, current, and estimated annual increases in (a) average wages of this country's workers, (b) the Consumer Price Index, and (c) the excess of (a) over (b) which can be considered an approximation to the growth of real wages.

	Percentage Increase Over Preceding Year In —		
	(a) National Avg. Wage	(b) Consumer Price Index	(c) "Real" Wage Growth: (a) - (b)
Avg. 1948-1953	5.5%	2.2%	3.3%
" 1953-1958	3.6	1.5	2.1
" 1958-1963	3.4	1.2	2.2
" 1963-1968	4.9	2.6	2.3
" 1968-1973	5.9	5.0	0.9
Year 1974	6.5	11.0	- 4.5
" 1975 (prelim.)	6.8	9.1	- 2.3
Estimate 1978	8.9 to 9.6	5.5 to 6.5	2.4 to 4.1
" 1981	6.6 to 6.8	4.0 to 5.0	1.6 to 2.8
" 1982 - 2050	5.25 to 6.25	3.0 to 5.0	1.25 to 2.25

The reader will see that real wage growth, as here defined, settled down soon after World War II to a remarkably steady performance of more than 2% a year until it was eroded by the stepped-up pace of inflation that began to afflict us in the middle 1960's. The SSA forecast foresees prompt emergence from the recent spate of negative wage growth but regards a future growth rate below 2% as more likely than a matching of that past performance. The assumptions used for future CPI suggest adherence to the view that we shall not return to the days of an American dollar of stable purchasing power.

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## TWA Flight #355

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ments, particularly the French, as to how to handle the hijacking. TWA appeared to be primarily interested in the safety of their passengers, and only secondarily interested in punishing the hijackers and discouraging future hijackings. The governments, on the other hand, appeared to have these priorities reversed, in that they seemed to be willing to put the passengers on Flight 355 in relatively more danger in order to capture the hijackers and discourage future hijackings. Although the government approach may, over the long run, place the fewest lives in danger, those on Flight 355 understandably preferred the TWA approach.

Third, this particular hijacking raised some interesting ethical issues. No one, least of all the victims, wants to encourage this type of dangerous and illegal activity. Yet these persons were by their admission fighting for freedom for their homeland, and their cause may have been just, even though the methods they used to publicize it resulted in the lives of innocent persons being endangered. *From their point of view*, the endangering, or even loss, of the lives of some innocent persons could be justified if the end result were freedom for millions.

In this regard, one must at least respect the courage, if not the judgment, of these hijackers. We in the United States have a free press in which to express our grievances. They did not, and so they chose what they believed to be the most effective means available. They had no weapons, and probably no intention to injure anyone. They must have known that they would not escape punishment. Yet they were willing to face lengthy prison sentences in order to publicize a cause they believed in.

The responsibility of society is to protect me and others by punishing them and making every effort to prevent future hijackings. This is as it should be. Yet the ethical issue remains: To what extent does the end justify the means? The answer may well depend on whether

## 1976 OASDI TRUSTEES REPORT

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## Estimates Of Population Size and Composition

The following table shows future U.S. population in selected years under each of the three "alternative" assumptions used in the Report. The figures are for (a) ages 20 to 64, i.e., approximately the normal work-span, (b) ages 65 and over, the retirement-span, and (c) to complete the population picture, the ages below 20.

## United States Population (in millions)

Age-Group	1975	Alternative I			Alternative II			Alternative III		
		1990	2010	2050	1990	2010	2050	1990	2010	2050
a. 20 to 64	122	148	170	200	148	167	156	147	165	137
b. 65 & over	23	29	33	51	29	33	50	29	33	49
c. Under 20	78	75	86	109	70	70	68	69	62	52
(b + c)	101	104	119	160	99	103	118	98	95	101
(a + b + c)	223	252	289	360	247	270	274	245	260	238
Dep. Ratio										
Old-Age	19%	20	19	26	20	20	32	20	20	36
Total	83%	70	70	80	67	62	76	67	58	74

First, a discussion of some of the messages conveyed by these figures, then a description of the demographic assumptions that produced them.

With respect to total United States population — a + b + c — the three alternatives result in very large differences as we move into the Twenty-first Century. One of the three pictures marked growth, one forecasts stability, and one portrays marked decline — the reader can take his or her pick. The two dependency ratios give grist for reflection; the old-age ratio is the ratio of b to a, while the total dependency ratio is the ratio of (b + c) to a. Although the first of these ratios appears headed for what some would consider a drastically adverse rise, the second of them should create no alarm whatever.

Population trend is determined by the net influences of mortality, migration, and fertility. On mortality the Report is regrettably unspecific beyond saying that mortality rates are assumed to "continue to follow the general trends established over the period 1950-1973 (resulting) in an overall reduction . . . of about 15 percent from 1973 to 2050." It is mentioned that "Mortality at the very young ages and at the ages over 55 is projected to improve relatively more than at the in-between ages." Annual net immigration is assumed to remain constant at 400,000 persons.

The key to what will happen to population growth is the fertility rate, some figures for which are displayed in the following table. The function displayed is the total number of children a woman will have during her entire child-bearing period if the age-by-age birth rates for the year remain unchanged.

one is a Croatian national or a passenger on TWA Flight 355.

As I prepared for my next plane trip, I was reassured by the actuarial fact that, if the odds against being hijacked once were a million to one, the odds against being hijacked twice were a trillion to one. Yet one thing disturbed me about this statistic. The passenger in the seat behind me on TWA Flight 355 had told me that it was the third time he had been hijacked!

## Actuarial Meetings

- Nov. 11, Baltimore Actuaries Club
- Nov. 11, Denver Actuarial Club
- Nov. 17, Seattle Actuarial Club
- Nov. 17/18, Actuaries Club of the Southwest
- Nov. 17/18, Southeastern Actuaries Club
- Nov. 30, Boston Actuaries Club