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ANSWERS TO COMPETITION Ω

The q's have it. All in all it was a monumental turnout, rivaling the first competition in number if not variety. Many were very clever ones any permanently retired actuary would be pleased to repose under. We're sorry we couldn't print them all and thank all our correspondents.

Perhaps predictably, plays on q_x were much in evidence, including some clever repeats such as: "He minded his p's but not his q's." (John Libera and Douglas Carey); "q_x'ed" (Jay Ripps and Vern Lindholm). We liked Allen Parks' "$q_x$ited" and Ernie Vogt's "Right on q, he met his omega." That theme also appeared in Z. Samuel Bernstein's epitaph for John Wilkes Booth: "Missed his q."

Michael Bell's
> His work was done
> His q was one
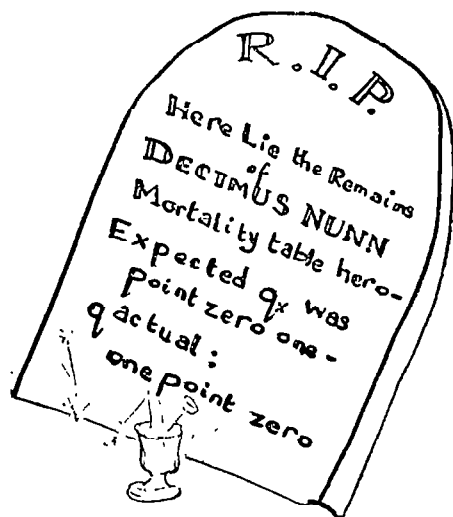
was also tolled by O. A. Reed:
> His q you see
> Had reached unity

Robert Dreyer's variation was:
> His/her cue was one

while Charles Groeschell gave us:
> He was much alive
> and on the run
> But his q65
> Became equal to one.

From Michael J. Cowell we received a picture on the subject (q_x-rated, we suppose), which we will endeavor to reproduce here (an *Actuary* first?)

Only slightly less popular was the force of mortality, such as Q (sic) Maltby's:
> Not here from sin
> μ did me in

and Edward Robbins' epitaph for a

U.S.A. COMMON STOCK VALUES WITH DIVIDENDS—1871 to 1978

by Herbert W. Hickman

Ed. Note: At our request, Mr. Hickman gives here an extension to 1978 of his table that appears in the Transactions, *XXII, 197. He has also calculated compound annual growth rates for the entire 107-year period. Readers in other countries are invited to send us corresponding growth rates for their stock exchange aggregates.*

INDICES OF COMMON STOCK VALUES
Including Reinvested Dividends Less 0.25% for Investment Expenses
1871 Average Value = 1.00
(Extension of Table 1 in XXII *TSA*, 197)

Year	Average Value	December Value
1968	1,568.94530	1,715.82112
1969	1,601.87472	1,515.62979
1970	1,415.12817	1,556.59853
1971	1,717.15898	1,757.34050
1972	1,954.79661	2,128.67577
1973	1,975.88887	1,770.96944
1974	1,593.23823	1,323.39147
1975	1,722.84816	1,808.61154
1976	2,105.07925	2,196.79755
1977	2,109.49992	2,061.48770
1978	2,161.81552	2,218.19567

Based on Standard & Poor's 500 monthly price and yield indices. Specific formulas shown in XXII *TSA*, 197.

COMPOUND ANNUAL GROWTH RATES OF AVERAGE COMMON STOCK VALUES
(Ten-Year Periods)

Period	Annual Increase	Period	Annual Increase
1871 - 1881	8.60%	1960 - 1970	7.05%
1880 - 1890	4.68	1961 - 1971	7.02
1890 - 1900	5.49	1962 - 1972	8.74
1900 - 1910	8.40	1963 - 1973	7.35
1910 - 1920	3.93	1964 - 1974	3.22
1920 - 1930	15.06	1965 - 1975	2.94
1930 - 1940	−1.28	1966 - 1976	5.07
1940 - 1950	10.58	1967 - 1977	4.01
1950 - 1960	16.25	1968 - 1978	3.26

Faculty of Actuaries' Lapse Study
Sir:

The article in the February *Actuary*, "Two Studies of Policy Lapse," prompts these observations by one who has examined with keen interest the Scottish investigation that you numbered (1), and who was a member of the committee that produced the American report that you numbered (2).

Two of the techniques used by the Scottish actuaries are of interest. The first was the decision to make the study on a calendar-year basis, since some of the seven contributing companies could not produce policy-year data. At duration zero, a half-year's exposure was counted for every case and the withdrawal rate for that duration (W_0) was calculated as twice the probability that a policy issued during the year would withdraw during the year. The other was their use of an index figure representing the probability (ignoring terminations due to mortality, etc.) of a policy remaining in force until the end of the t th year. This index was calculated as

$$(1 - \tfrac{1}{2}W_0)\ (1 - W_1)\ (1 - W_2) \ldots\ldots (1 - W_t)$$

This index offers a compact means of comparing withdrawal rates, and seems to me to be a possibly useful means for disclosing to regulators or to the general public the magnitudes of lapse rates. A similar approach was used in part by the Senate Antitrust & Monopoly Subcommittee (Hart Committee) in its 1974 analysis of lapse rates. Figures from it are quoted in our committee's report to the NAIC, pp. 23-27.

The patterns of withdrawal are very different during the first few years, even when Scottish and American studies are put on a common basis. For comparison, I converted two of the seven classes of business in the Faculty Group's study to an approximate policy-year basis, using the assumptions in Moorhead's paper (*TSA* XII, p. 547). Class WL (with profits whole life) is generally comparable to studies made of permanent life insurance in this country (See Brzezinski, *TSA* XXVII, p. 278) and Class TA (Term Assurances) is directly comparable with the same class (ibid., p. 279). The Scottish rates compare with their LIMRA counterparts as follows, on a year-by-year by-policy basis.

Policy Year	Permanent		Term	
	Scotland	U.S.	Scotland	U.S.
1	3.3%	20.6%	2.3%	21.7%
2	4.6	8.4	4.5	12.3
3	6.6	5.1	5.7	9.2
4	5.4	4.5	7.1	7.4
5	4.8	4.1	6.9	7.3
6	4.3	3.5	6.0	5.4
7	4.1	3.2	5.2	4.9
8	3.7	2.9	4.8	4.8
9	3.4	2.6	4.4	4.8
10	3.0	2.5	4.2	5.2
5 year index	77.6	63.2	76.1	53.5
10 year index	64.3	54.4	59.1	41.4

In these examples, I have, since both sets of rates are on a policy-year basis, ignored the adjustment $(1 - \tfrac{1}{2} W_0)$.

Age differences were much as we have observed in this country, that is, withdrawal rates are lower with increasing age at issue. Female data was rather scanty in the comparable classes, WL and TA being only 7% each of the 1975 data. The results of the two classes are at opposite ends of the experience, female WL withdrawal rates being 119% of corresponding male rates, but female TA rates only 76%.

Premium payment frequency, there as here, has a substantial effect. For these two classes, actual to expected ratios are for 1976 issues.

Premium Frequency	Class WL	Class TA
Annual	86%	115%
Monthly	105	91
Other	114	109

In the United Kingdom a change in commission structure was made in 1976, such that commissions generally are now more nearly related to premium than was the case before. The Scottish actuaries' speculation on the significance is worth direct quotation:

"Slightly more rates have increased than decreased but there are no changes of any great significance except that the duration 0 rates have reduced in every case apart from WE and OE (these are classes of endowment insurance) and it is interesting to speculate that perhaps premium-related commission is going to have a significant effect on withdrawal rates since these are the two classes where the effect of the commission change is generally beneficial to the agents."

W. Keith Sloan

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Competition

stubborn actuary (a redundancy like "damn Yankee") :

> "An immovable object who
> Met an irresistable μ"

It was left for Bill White to unify those themes with:

> Old actuaries never σ
> They just μ away

which brings us to Stanley Old's epitaph for a lion-tamer:

> Cat-astrophe

Z. Samuel Bernstein added:

> Lizzie Borden
> A_x

From which we graduate to Jan Poll-now's:

> Foretold his fate
> Using spline and weights

and Steven Martineau's epitaph for a martyred student of graduation:

> He gave his life to smooth the curve

O. A. Reed noted:

> Exposed no longer
> To mortal risk

which fact Warwick Jamieson opines is:

> The Final Graduation
> The Ultimate Selection

or, as J. Kenneth Wood Jr. would have it,

> Truncated

Richard Schreitmueller went to great depths to explain his epitaph for a bridge player:

> Down six

but we had already fathomed it.

Perhaps echoing Ralph Edwards' collective noun "Reserve of actuaries," John Libera memorialized the profession with:

> God preserve
> This deceased
> Once reserved
> Now released

A more pithy version is Peter A. Christensen's:

> Terminally reserved

Refusing to be underfunded, Robert Bostian gave us an epitaph for a pension actuary:

> With little pain
> An actuarial gain

Charles Galloway waxed more philosophical with:

> Discount and chance
> Are in the past
> Released from risk
> Dead right at last

We were especially pleased to have an entry from the now eligible ex-editor, A. C. Webster:

> Here in hopes of a cooler clime
> Lies an actuary — dead on time