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Employee Termination Study

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OVERVIEW OF THE STUDY

A research project was undertaken at Booke & Company to analyze patterns of employee terminations for use by consulting actuaries in valuing postretirement benefits programs. Use of explicit assumptions in valuing pension plans as well as postretirement medical programs creates a need for a simple but reliable basis for selecting employee termination assumptions.

There has been an absence of research or general information for practicing actuaries on employee termination patterns since Crocker, Sarason, Straight (*The Actuary's Pension Handbook*, Pension Publications, 1955) published the T tables in 1950. The T tables and variations thereof have been used by pension actuaries in many applications over the years. This research points out, however, that the fundamental slope of the T tables does not match the actual shape of the study's experience curve with respect to ultimate termination rates.

The analysis indicates a very consistent pattern of ultimate termination rates for employees in different industries and for employee groups in different economic conditions. The study compared termination patterns for employee groups from 1978 through 1980 versus termination patterns of similar employee groups from 1987 through 1989. Termination patterns were compared for employees in the financial services sector, health care services sector, and manufacturing organizations. Each employee group within the industry studied as well as among the various industries studied exhibited very consistent patterns of termination rates.

Shown in Table 1 is the three-year select and ultimate withdrawal table we have developed. The *ultimate* withdrawal rates reflect an average termination rate of the covered group under review of 7.8 percent. If the ultimate average termination rate for an employee group is available, then the ultimate termination rates illustrated may be adjusted to fit the overall termination activity expected in the group by simply multiplying the rates by the ratio of the actual termination rate of the group under consideration to 7.8 percent. (The vested termination rate is a reasonable approximation of the ultimate termination rate.) Examples of this adjustment are included in the Appendix. Documentation of the data included in the study and supporting observations are set forth in this paper.

Table 1
V Select & Ultimate Table
Number of Employee Exits per 100

Age	Years of Service			
	1	2	3	4 or more
20	29.8	25.0	21.0	18.6
21	29.4	24.5	20.5	17.6
22	29.0	24.0	20.0	16.6
23	28.6	23.5	19.5	15.6
24	28.2	23.0	19.0	14.6
25	27.8	22.5	18.5	13.6
26	27.4	22.0	18.0	12.6
27	27.0	21.5	17.5	11.6
28	26.6	21.0	17.0	11.1
29	26.2	20.5	16.5	10.6
30	25.8	20.0	16.0	10.1
31	25.4	19.5	15.5	9.6
32	25.0	19.0	15.0	9.1
33	24.6	18.6	14.6	8.7
34	24.2	18.2	14.2	8.3
35	23.8	17.8	13.8	7.9
36	23.4	17.4	13.4	7.5
37	23.0	17.0	13.0	7.1
38	22.6	16.6	12.6	6.9
39	22.2	16.2	12.2	6.7
40	21.8	15.8	11.8	6.5
41	21.4	15.4	11.4	6.3
42	21.0	15.0	11.0	6.1
43	20.6	14.7	10.7	5.9
44	20.2	14.4	10.4	5.7
45	19.8	14.1	10.1	5.5
46	19.4	13.8	9.8	5.3
47	19.0	13.5	9.5	5.1
48	18.6	13.2	9.2	4.9
49	18.2	12.9	8.9	4.7
50	17.8	12.6	8.6	4.5
51	17.4	12.3	8.3	4.3
52	17.0	12.0	8.0	4.1
53	16.6	11.7	7.7	3.9
54	16.2	11.4	7.4	3.7

Average ultimate termination rate = 7.8%.

SCOPE OF THE STUDY

The analysis includes experience data for five financial institutions, five health-care providers, and four manufacturing firms. The criteria used to select the employers to be included in the study were (a) no unusual mergers, reorganizations, and the like, during the periods 1987 through 1989 under review, and (b) each organization has at least 1,000 employees during each year of the review period.

The study encompassed 79,157 employee units of exposure, all with at least one year of service and under age 55. The ultimate withdrawal rates reflect termination patterns for employees with four or more years of service and less than age 55.

Withdrawals Are from All Sources—Terminations, Deaths and Disabilities

Employees above the age of 54 are excluded in order to omit any patterns of exits that are influenced by companies' specific retirement plans. The select period encompasses employees with at least one year of service but less than four. Employees with less than one year of service were disregarded in the study because they are usually not eligible for participation in postretirement benefit programs with less than one year of service.

Table 2

	Bank 1	Bank 2	Bank 3	Bank 4	Bank 5	Total Banks
Total employees 1987–1989 with 1 or more years of service and under age 55	4,228	8,946	5,820	7,844	5,848	32,330
Total employees 1987–89 with 4 or more years of service and under age 55	2,612	4,851	3,204	4,975	3,093	18,735
Overall average termination rate (with at least 1 year of service—all ages)	13%	14%	14%	14%	19%	15%
Termination rate for employees with 4 or more years of service and under age 55	8%	8%	8%	8%	13%	9%
Select rate for employees with 1 to 3 years of service and under age 55	22%	21%	21%	26%	26%	23%

Table 3

	Hospital 1	Hospital 2	Hospital 3	Hospital 4	Hospital 5	Total Hospitals
Total employees 1987-1989 with 1 or more years of service and under age 55	2,870	8,035	5,210	4,242	2,880	23,237
Total employees 1987-89 with 4 or more years of service and under age 55	1,703	5,584	3,460	2,857	1,493	15,097
Overall average termination rate (with at least 1 year of service— all ages)	16%	9%	9%	10%	16%	11%
Termination rate for employees with 4 or more years of service and under age 55	11%	6%	6%	6%	12%	7%
Select rate for employees with 1 to 3 years of service and under age 55	24%	19%	15%	16%	19%	18%

Table 4

	Manufacturer 1	Manufacturer 2	Manufacturer 3	Manufacturer 4	Total Manuf.
Total employees 1987-1989 with 1 or more years of service and under age 55	6,773	3,029	2,634	11,154	23,590
Total employees 1987-89 with 4 or more years of service and under age 55	4,577	2,065	1,738	5,778	14,158
Overall average termination rate (with at least 1 year of service— all ages)	8%	14%	8%	16%	13%
Termination rate for employees with 4 or more years of service and under age 55	5%	9%	5%	8%	7%
Select rate for employees with 1 to 3 years of service and under age 55	14%	22%	10%	24%	20%

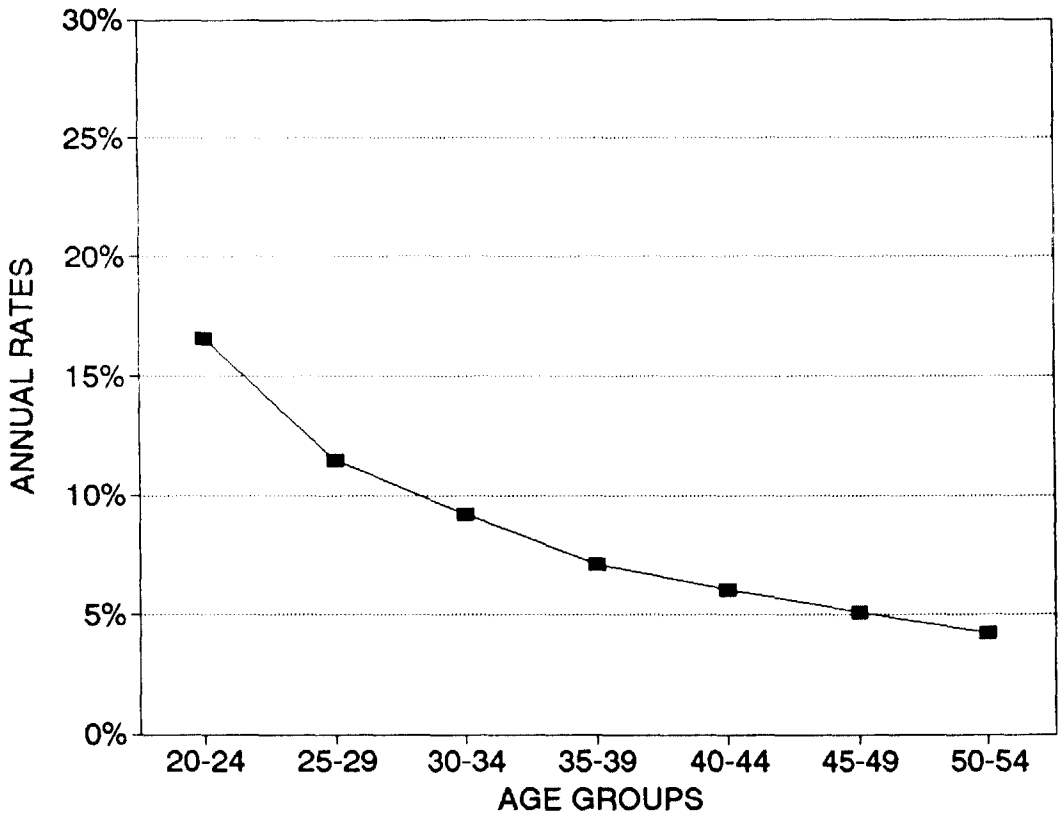
Table 5

	Grand Totals
Total employees 1987-1989 with 1 or more years of service and under age 55	79,157
Total employees 1987-89 with 4 or more years of service and under age 55	47,990
Overall average termination rate (with at least 1 year of service—all ages)	13%
Termination rate for employees with 4 or more years of service and under age 55	7.8%
Select rate for employees with 1 to 3 years of service and under age 55	21%

ANALYSIS OF THE RESULTS

Chart 1

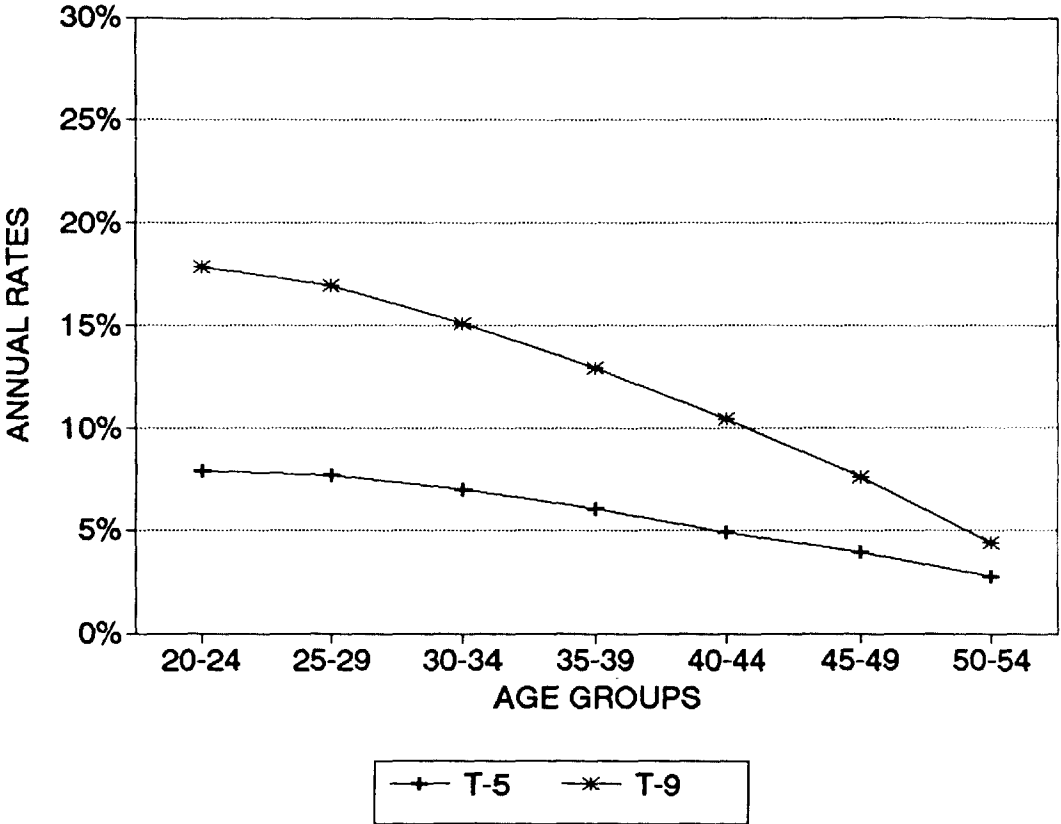
V ULTIMATE TABLE



- The termination patterns represented in this group of 47,990 employees, and in all other aspects of the analysis, show a consistently smooth sloping curve decreasing with age, as would be expected.
- The shape of the curve is also consistently concave up.

Chart 2

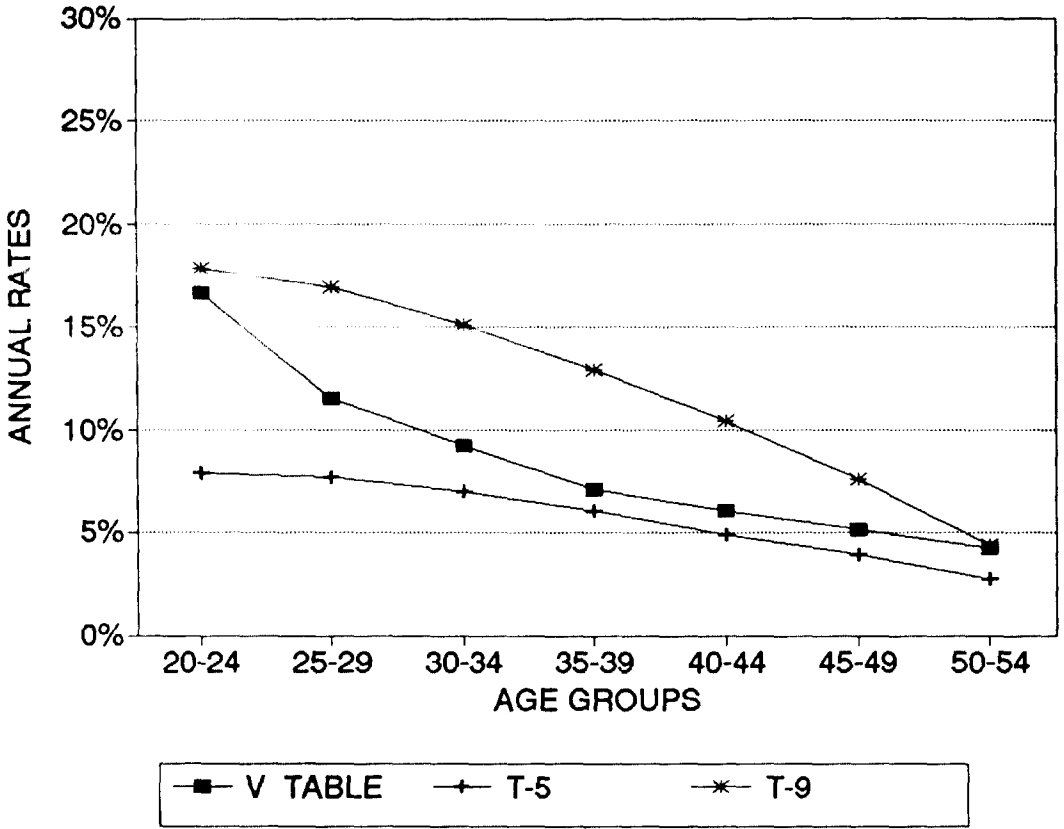
T-5 AND T-9 TABLES



- The T tables, which have served as a basis for termination assumptions used by many consulting actuaries, show a slightly convex slope.

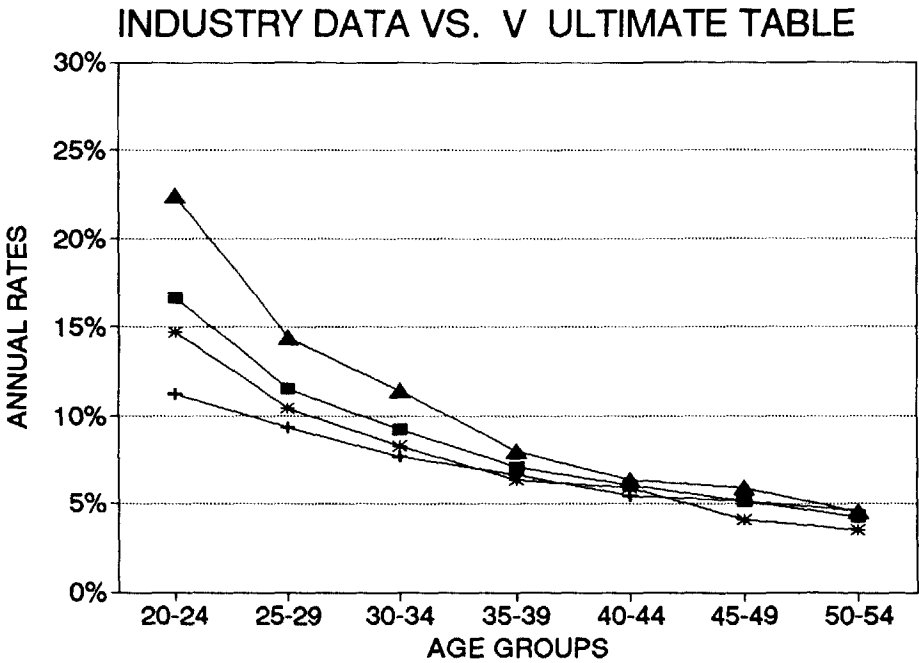
Chart 3

V ULTIMATE TABLE VS. T-5 & T-9 TABLES



- Note the difference in the slopes of the curves.

Chart 4



■ V TABLE + HOSPITALS * MANUF. ▲ BANKS

- Although the level of turnover for financial institution employees was 9% versus 7% for health-care organizations and 7% for manufacturing organizations overall, note the consistently uniform slope of the curves.

Chart 5

INDIV. BANK DATA VS. V ULTIMATE TABLE

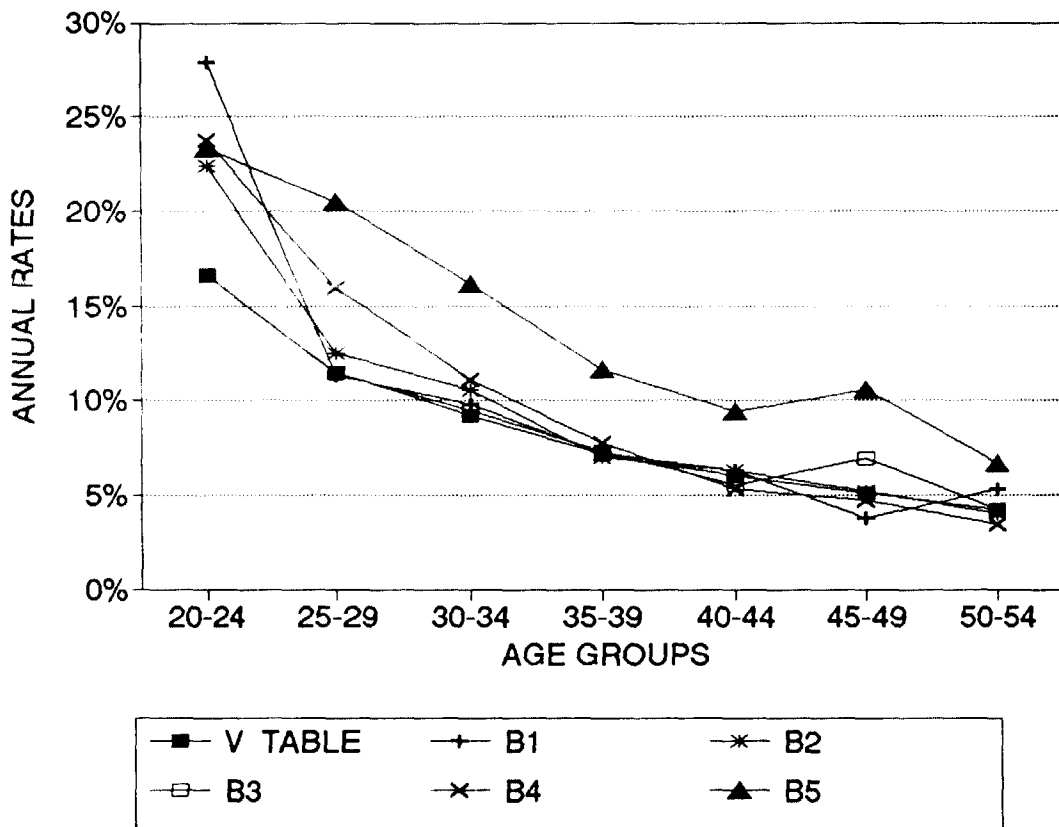
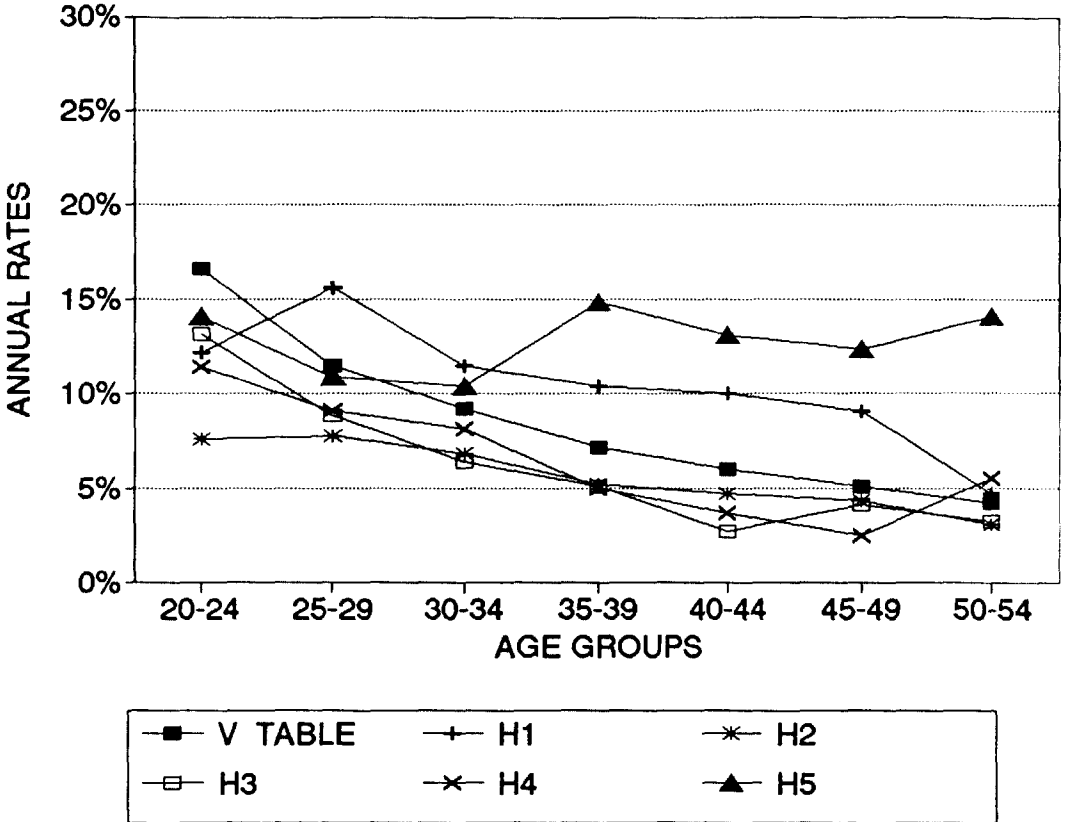


Chart 6

INDIV. HOSP'S VS. V ULTIMATE TABLE



- Hospital 1 and Hospital 5 had 1,703 and 1,493 employees, respectively, in the ultimate period under review. The small exposure accounts for the erratic pattern of termination rates.

Chart 7

INDIV. MANUF. VS. V ULTIMATE TABLE

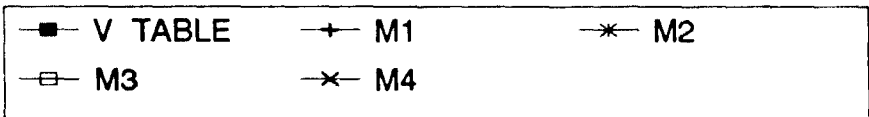
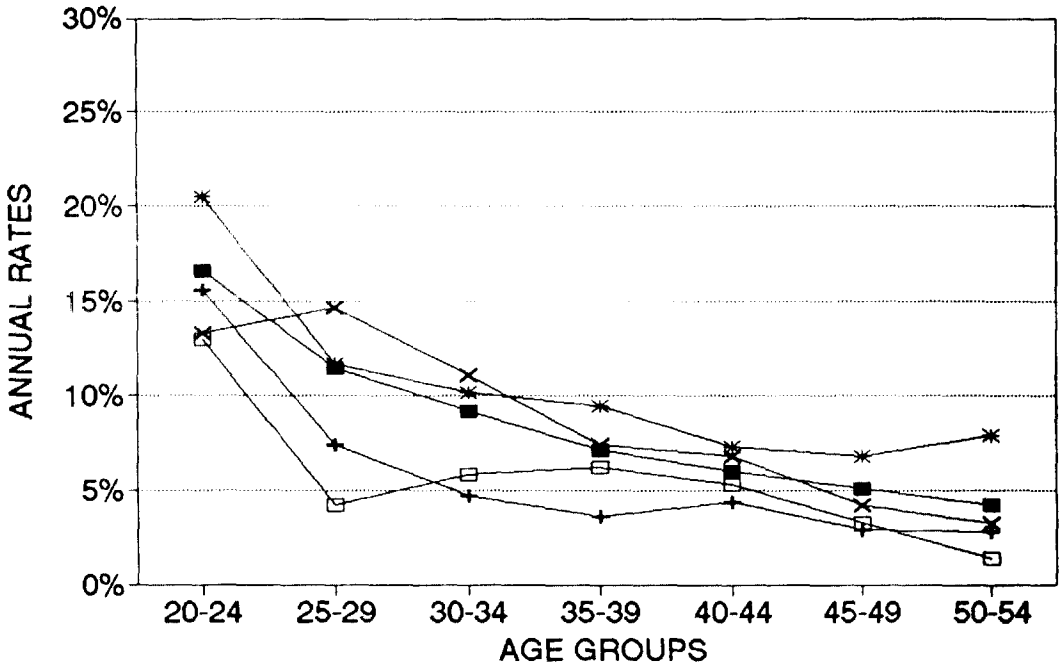
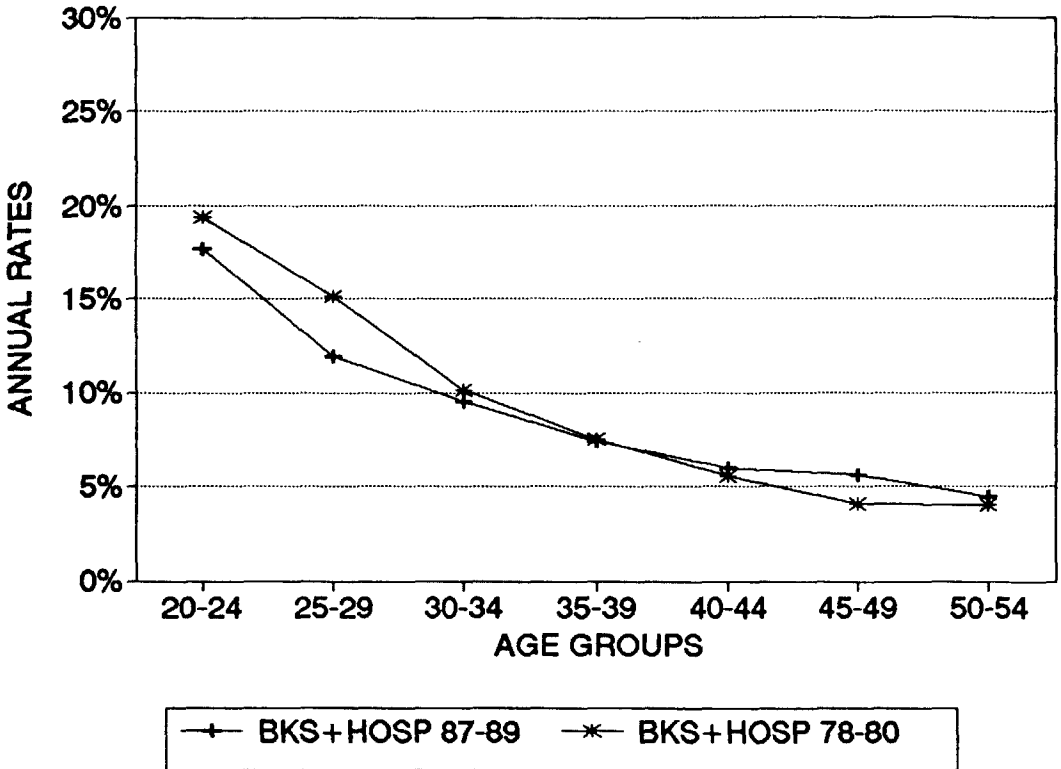


Chart 8

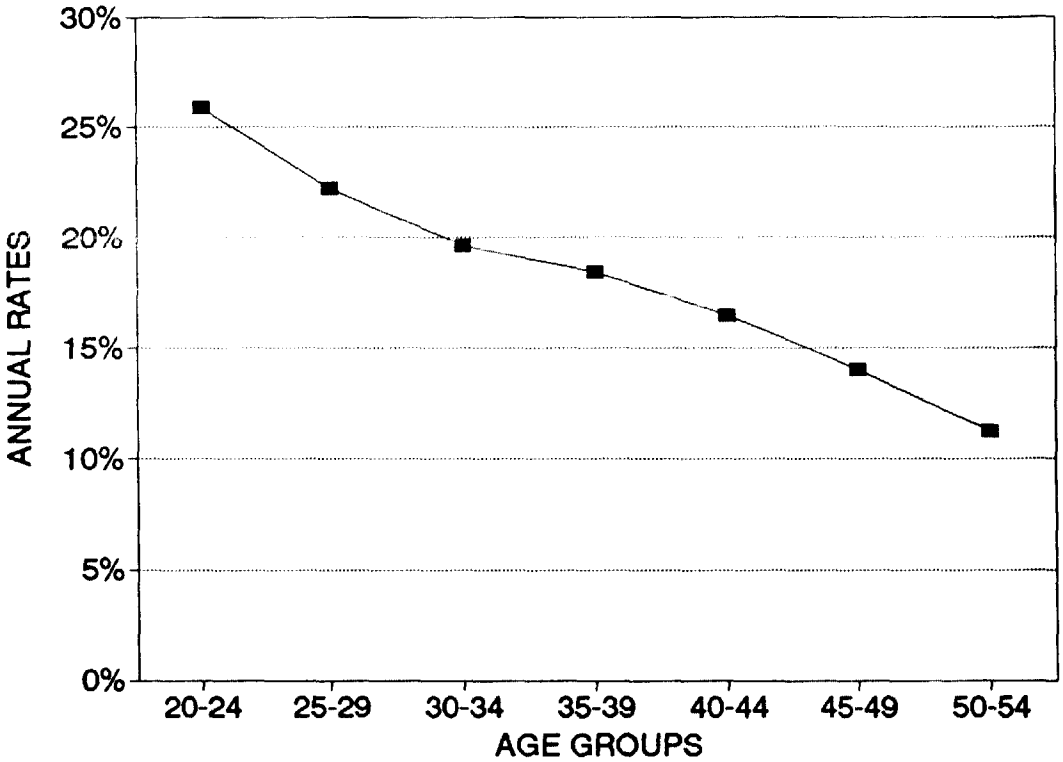
87-89 EXPERIENCE VS. 78-80 EXPERIENCE ULTIMATE RATES



- The results of the current analysis were compared with those from a study conducted at Booke & Company analyzing bank and hospital termination activities for the calendar years 1978 through 1980. The results for financial institution employees were almost identical, while the termination rates for health-care providers were slightly lower in the more recent study. Overall the pattern of terminations was remarkably consistent.
- Note that the economic conditions in the southeastern U.S., which serves as the basis for most of the data included in both studies, were quite different in the late 1970s versus the late 1980s. The ultimate termination patterns appear to be remarkably consistent in a slow growing economic environment versus a radically expanding economic environment.

Chart 9

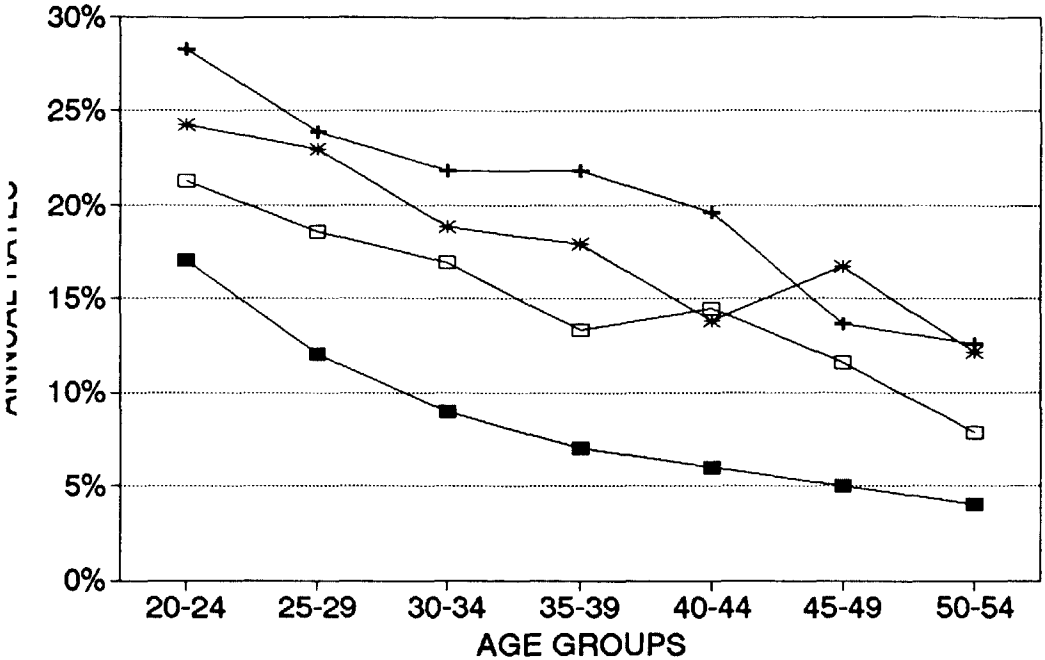
1987-89 SELECT EXPERIENCE
YEARS 1, 2, & 3 COMBINED



- When the years one through three are combined, the age sensitivity is still apparent, with the rates declining from 26% in the earliest age bracket to 12% in the 50 to 54 age bracket.

Chart 10

1987-89 UNADJUSTED DATA
3 YEAR SELECT AND ULTIMATE

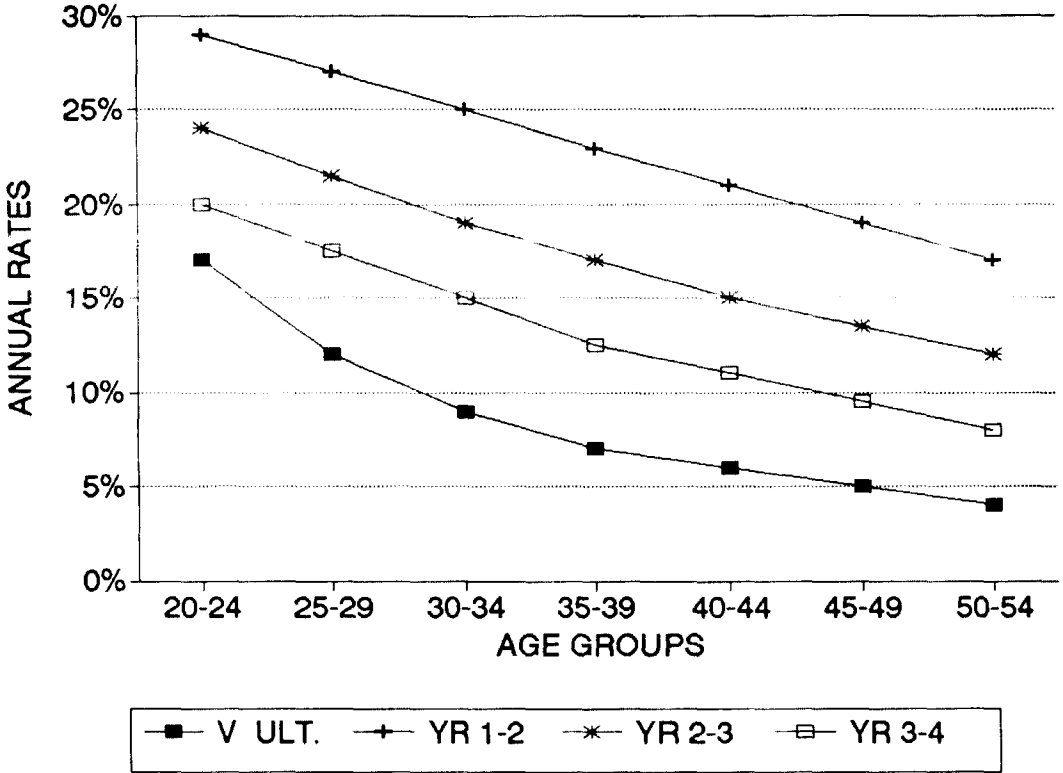


■ ULTIMATE + YR 1-2 * YR 2-3 □ YR 3-4

- The data included in the select period were too thin to be very accurate at the upper ages: 13,965 in year one, 9,885 in year two, and 7,013 in year three.
- Although the select rates decrease less rapidly with increasing age than the ultimate rates do, there still is a definite downward trend in the select rates.

Chart 11

V SELECT AND ULTIMATE TABLE SMOOTHED SELECT RATES



- The select rates were adjusted to reflect a slightly flatter trend in the first year of plan participation (with one year of service but less than two) and becoming more age-sensitive in the second and third year.

APPENDIX

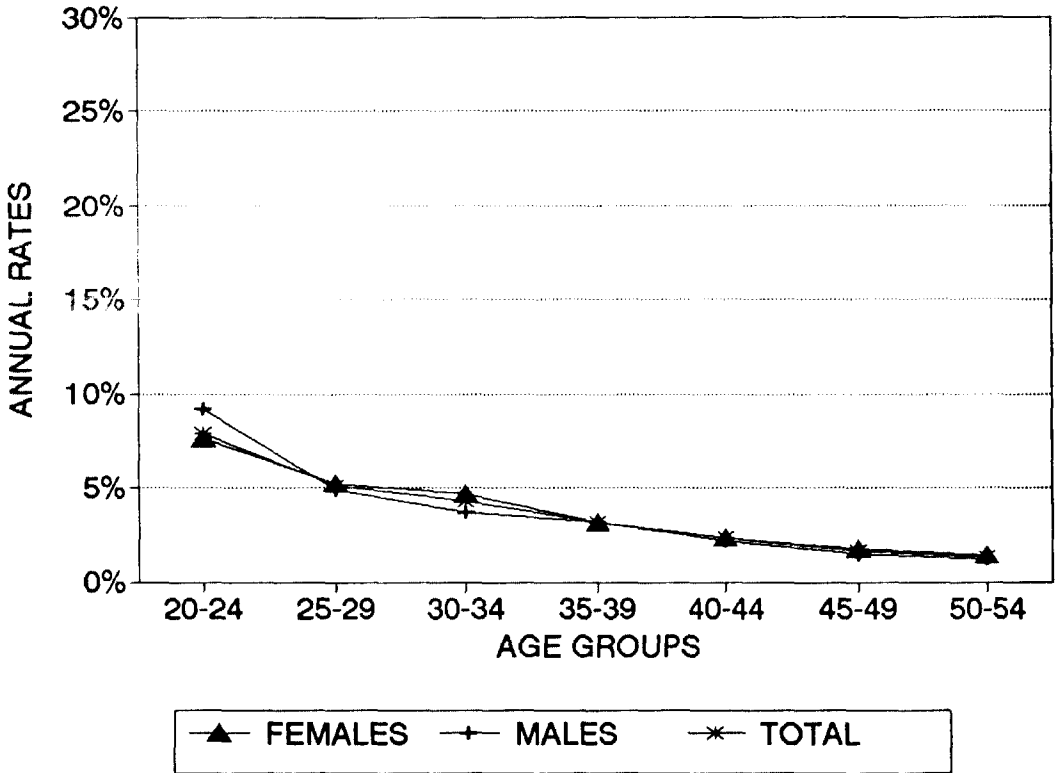
To test the results of the study and the applicability of the results to other employee groups, the termination patterns for a major public utility located outside the southeastern U.S. were analyzed. The objective was to obtain an independent verification of the general slope of the ultimate termination pattern as well as to test the "fit" of the experience study by adjusting the table to the overall level of the termination activity.

The study of the utilities employees' termination patterns covered 114,077 employees with four or more years of service and under the age of 55 and 5,948 employees in the select period (at least one year but less than four years).

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Chart 12

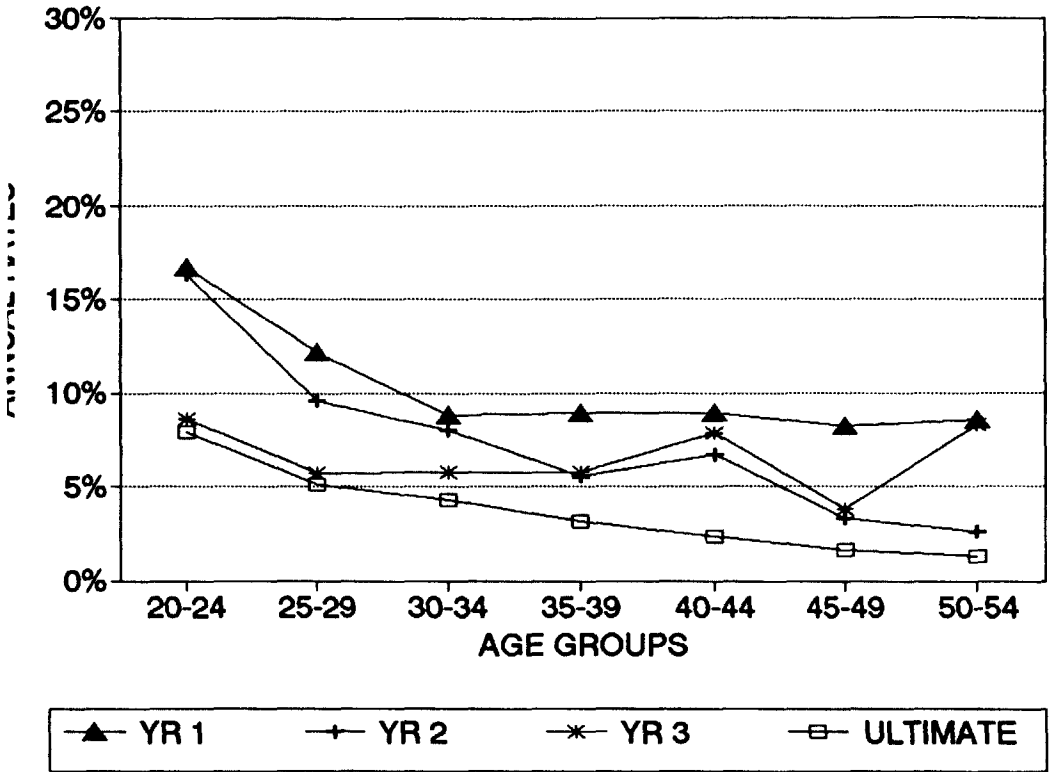
TEST CASE - PUBLIC UTILITY ULTIMATE RATES



- Employees' termination patterns were analyzed by sex as well as age. Little variation occurs except a slightly higher termination rate for females in the age 30 to 34 bracket. The data were too thin in the 20 to 24 age bracket to draw any conclusions.

Chart 13

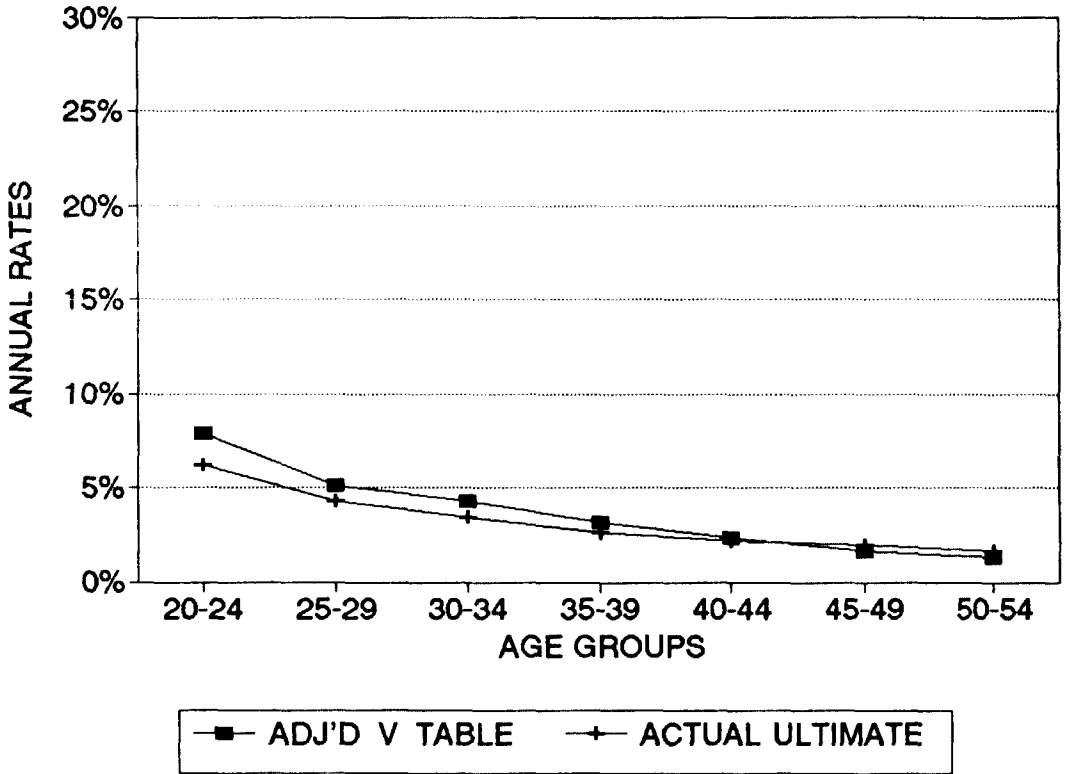
TEST CASE - PUBLIC UTILITY UNADJUSTED DATA



- The data in the select period were also inadequate to produce a smooth trend.

Chart 14

TEST CASE - PUBLIC UTILITY ACTUAL VS. ADJUSTED V ULTIMATE TABLE



- Since the ultimate termination rate underlying the V Table was 7.8% and the utilities employees' termination rate for employees included in the ultimate analysis was 2.9%, we took the ratio of 2.9% to 7.8% and adjusted the V Table to compare it with the actual termination experience. The graphs above indicate that even for a very low turnover group, the table as adjusted does provide a reasonable fit.