

DISABILITY RETIREMENT COSTS – U.S.A.

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Special provisions for immediate payment of pension benefits in the case of total and permanent disability are found in many private pension plans in the United States. Indeed, some of the very earliest plans required disability as a condition for retirement. The 1975 Study of Corporate Pension Plans prepared by Banker's Trust Company, New York, indicated that 80% of the plans studied provided a special retirement benefit for disabled employees. The proportion may be somewhat lower among the pension plans of smaller groups and plans that are insured.

Usually an employee must meet either an age or service requirement, or both, in order to be eligible for disability retirement. Most commonly ten years of service with the employer is required without regard to age and the full accrued pension is payable immediately. Occasionally special supplements are payable until the commencement of Social Security. Where disability income benefits are provided up to 65 under a separate long-term disability plan, the pension is deferred to age 65 with benefits projected forward by crediting the disabled employee with service to age 55 or 65.

While disability can be characterized as a medically determinable state, the cost of providing disability retirement benefits depends on the economic climate, the availability of employment, the motivation to work and a host of other factors. Placing an accurate cost on a disability retirement provision requires considerable judgment and frequently must be made for a particular plan in the total absence of data relating to the particular group of employees or the particular plan provisions.

This paper discusses some of the factors affecting the cost of disability retirement and some of the statistical bases available for cost determination.

Factors Affecting Costs

The probability that an active worker will become disabled in the course of a year to a degree sufficient to qualify for disability pension is referred to as the disability incidence rate. Disability pensions can be terminated upon death or upon full recovery and return to work, and these probabilities in combination are referred to as termination rates. Disability incidence and termination rates are the bases for developing the cost of a disability pension under a particular retirement plan. These rates vary with a good many different factors but the following are some of the more important ones:

1. **Age.** The disability incidence rate increases with age. The rate at age 65 may, for example, be 40 or 50 times as great as the rate at age 20. Usually the eligibility conditions for disability retirement are indirectly age related, so that the rate of disability retirement applicable to all employees in a given pension plan is sharply diminished at ages under 30 or 35 by any age or service requirement which in effect means only a portion of the total group is really eligible for disability benefits. Because of such eligibility requirements, the incidence rates at the younger ages are relatively unimportant in terms of costing a disability retirement benefit. At the other end of the range, the availability of early retirement

rights tends to depress the disability incidence rates at the older ages.

2. **Sex.** The incidence of disability is generally lower for female employees than for male employees. This is partly due to the particular types of jobs which men and women take. Currently, female disability incidence rates are running around 80% of the male rates. The termination rates for female workers are also lower than for males so that the net effect of both rates on the cost of a disability retirement provision is actually minimal. Probably sex could be eliminated from the costing structure and replaced with data regarding job hazards without any serious loss in accuracy. Certainly the actuary with no data as to the sex of the covered plan participants could still develop fairly accurate disability retirement costs.
3. **Economic Climate.** Although the pure medical state of disability is undoubtedly independent of stock market levels and corporate profits, as a practical matter when business turns down and substantial numbers of employees are laid off, the disability incidence rates increase markedly. Also when unemployment is high, recovery rates are significantly lower because of a lack of work alternatives. The effect of the economic climate would be expected to apply to a greater degree at the younger ages where lay-offs of short-service workers are most likely to occur and unemployment is highest, but there has been only a slight flattening out of the pattern of incidence rates by age in the recent experience. The disability incidence rates by calendar year in any given decade may vary by a factor of three to one, however, and the trend in disability incidence rates by calendar year is thus most important in estimating prospective disability retirement costs.
4. **The Definition of "Disability".** Plan provisions may require permanent and total disability or simply total disability that has lasted for a period long enough for permanence to be presumed. The requirement may be that disability must prevent the employee from doing any work whatever or simply from working at his own job. Disability awards may be deferred from the date disability commences by as much as six months to one year under plans which operate in conjunction with short-term sickness and accident programs providing income for temporary total disability. The incidence of disability retirement clearly decreases as the waiting period increases and varies with the relative liberality of the definition of disability and further with the strictness or laxity of its interpretation in the administration of the plan.
5. **Level of Benefit.** Where substantial disability benefits are provided, the very existence of the benefit encourages some employees to seek disability retirement as an easier way of life than working. Furthermore, a substantial benefit as a proportion of lost earnings reduces the financial incentive to rehabilitation and can result in lower than normal recovery

rates. Individuals who were forced to continue working before the existence of a disability retirement provision simply because of financial necessity, may elect to retire on disability if generous disability pensions are made available. Thus disability incidence rates tend to increase and recovery rates tend to decrease as the level of disability pension rises as a percent of pay.

6. **Early Retirement Benefits.** Under Social Security, the availability of actuarially reduced benefits upon retirement at or after age 62 has been found to have a noticeable effect in lowering the disability incidence rate at ages 62-64 because application for disability and the successful prosecution of the claim is rewarded much less highly than at ages below 62 where the alternative would be no income whatever. Similarly, under private retirement plans which offer unreduced pensions after 30 years' service, very few employees with 30 years' service bother to claim and prove disability in their application for pension benefits. Sharply lower incidence rates are thus found at those ages where generous early retirement benefits are available.

Social Security

The United States Social Security program covers practically all workers in the U.S. Accordingly, the experience data developed by the Social Security Actuary serves as a useful starting point in the development of disability retirement costs under private retirement plans.¹

Disability incidence rates by age and sex for years 1956-64 as published in Actuarial Note Number 58 are shown in Table A. Incidence rates for years 1965-1975 were published in Actuarial Study Number 74 (January, 1977) and Number 75 (June, 1978). These rates are shown in Table B. The earlier rates were based on year of onset. The Table B rates are based on data developed on the basis of year of entitlement. While statisticians would prefer to work with values based on the onset of disability, the actuary prefers to work with values based on date of entitlement because the important event in costing a program is the payment of benefits rather than the state of health. The incidence rates based on year of onset are about 15% higher than those based on entitlement because of the increasing exposure and because of the one year limit on retroactivity of entitlement.

The sharp increase in incidence rates at ages under 35 between 1967 and 1968 was due to a change in the program reducing eligibility requirements from five years of employment in the last ten to employment for half the period of time elapsing since age 21. Thus, the rates incorporated some catch-up. The program was also liberalized in 1972 to require only five full calendar months of disablement instead of six. The 1972 Amendments resulted in a gradual increase in the level of benefit as a percentage of current pay.

¹The various Actuarial Notes and Reports may be obtained from The Office Of The Actuary, Social Security Administration, 707 Altmeyer Building, 6401 Security Boulevard, Baltimore, Maryland 21235.

TABLE A

Estimated Disability Incidence Rates Under The U.S. Social Security Program by Age at Onset and Sex, for Onsets in 1956-64, Based on Actual Awards Before 1967 and Estimated Awards After 1966

(Rates per Thousand)

Age at Onset ¹	Year of Onset									
	1956	1957	1958	1959	1960	1961	1962	1963	1964	
	MEN									
Under 25	1.1	.8	.6	.5	.6	.5	.5	.5	.5	
25-29	.7	.8	.8	.8	.9	.9	.8	.8	.8	
30-34	.7	.8	.8	.9	1.2	1.2	1.2	1.2	1.3	
35-39	.8	1.0	1.1	1.2	1.7	1.7	1.8	1.8	1.9	
40-44	1.2	1.4	1.6	1.8	2.5	2.6	2.7	2.6	2.8	
45-49	2.3	2.6	2.8	3.1	4.1	4.2	4.3	4.3	4.5	
50-54	5.2	6.1	6.8	7.1	7.7	7.7	7.8	7.8	7.7	
55-59	10.4	11.8	12.9	13.8	14.0	14.1	14.4	14.3	14.1	
60-64 ²	16.8	18.7	22.2	22.7	22.3	17.8	18.7	19.1	19.2	
	WOMEN									
Under 25	.2	.2	.2	.2	.3	.3	.3	.3	.3	
25-29	.4	.3	.4	.4	.5	.5	.5	.5	.5	
30-34	.5	.6	.6	.7	.8	.8	.9	.9	.9	
35-39	.7	.8	.9	1.0	1.2	1.3	1.4	1.5	1.5	
40-44	1.0	1.2	1.3	1.5	1.9	1.9	2.2	2.1	2.2	
45-49	1.9	2.2	2.2	2.5	3.1	3.2	3.4	3.4	3.5	
50-54	4.1	4.4	5.0	5.0	5.4	5.6	6.0	6.0	6.1	
55-59	7.0	7.9	8.5	9.0	9.8	10.1	10.3	10.1	10.2	
60-64 ²	5.4	5.7	8.0	8.5	9.6	10.2	10.4	10.7	11.1	

¹Age on birthday in year of onset

²Includes the limited amount of experience before age 65 for persons who attain age 65 in the year of onset.

Source: Actuarial Note 58 Table 4

TABLE B

**Disability Incidence Rates under The U.S. Social Security Program by
Calendar Year of Entitlement, Age at Entitlement, and Sex,
Based on Awards Made Before October, 1975**

(Rates per Thousand)

Calendar Age at Entitlement	Calendar Year of Entitlement											
	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	Est. 1977
	MEN											
Under 25	.3	.6	.7	2.1	1.1	1.0	1.0	1.1	1.4	1.5	1.5	1.4
25-29	.7	.8	.9	1.9	1.2	1.2	1.3	1.5	1.8	2.0	2.0	1.9
30-34	1.2	1.2	1.3	1.7	1.5	1.7	1.7	2.0	2.4	2.6	2.5	2.4
35-39	1.7	1.8	1.9	2.0	2.2	2.4	2.6	3.0	3.4	3.5	3.4	3.4
40-44	2.6	2.5	2.8	3.1	3.1	3.5	3.7	4.2	5.0	5.3	5.1	5.0
45-49	3.8	3.9	4.3	4.5	4.6	5.3	5.9	6.6	7.8	7.9	7.7	7.7
50-54	6.5	6.7	6.8	7.4	7.4	8.8	9.9	11.2	13.2	13.4	13.0	13.0
55-59	11.9	12.3	12.5	13.0	13.7	15.6	17.4	20.0	23.5	22.8	22.5	22.7
60-64 ¹	12.7	15.4	18.4	19.9	20.4	22.3	24.8	27.6	32.2	29.4	28.8	30.2
	WOMEN											
Under 25	.2	.2	.3	.7	.3	.4	.4	.5	.7	.8	.7	.7
25-29	.4	.5	.5	1.2	.7	.7	.8	.9	1.2	1.3	1.2	1.2
30-34	.9	.9	1.0	1.7	1.3	1.3	1.4	1.7	2.2	2.2	2.0	2.1
35-39	1.6	1.6	1.8	1.9	1.9	2.1	2.3	2.6	3.4	3.4	3.0	3.1
40-44	2.1	2.4	2.5	2.6	2.7	2.8	3.2	3.9	4.8	5.1	4.7	4.6
45-49	3.1	3.2	3.7	3.6	4.1	4.6	4.8	5.9	7.4	7.4	6.7	6.8
50-54	5.5	5.8	6.3	6.5	6.7	7.3	8.0	9.6	11.9	12.0	11.0	11.1
55-59	9.6	9.6	9.8	10.4	11.0	12.3	14.1	15.9	19.6	19.2	17.6	18.0
60-64 ¹	9.5	9.9	10.4	11.5	11.8	13.0	14.2	16.5	20.6	20.4	19.0	19.0

¹Includes the limited amount of experience before age 65 for persons who attain age 65 in the year of entitlement.

Source: Years 1965-71, Actuarial Study Number 74 Table 3

Years 1972-77, Actuarial Study Number 75 Table 3 and Table 4

TABLE C

Social Security Disability Incidence Rates by Age

Age Group	Men 1963	Men 1975	Ratio % 1975/1963	Women 1963	Women 1975	Ratio % 1975/1963
Under 25	.5	1.5	300%	.3	.7	233%
25-29	.8	2.0	250	.5	1.2	240
30-34	1.2	2.5	208	.9	2.0	222
35-39	1.8	3.4	189	1.5	3.0	200
40-44	2.6	5.1	196	2.1	4.7	224
45-49	4.3	7.7	179	3.4	6.7	197
50-54	7.8	13.0	167	6.0	11.0	183
55-59	14.3	22.5	157	10.1	17.6	174
60-64	19.1	28.8	151	10.7	19.0	178
Weighted Average	5.4	9.1	169	3.9	7.4	190

TABLE D
Annual Cost of Social Security Temporary Disability Annuity
for Calendar Years 1963 and 1975 by Age and Sex

Age Group	Male Incidence	Male 5½% Annuity	Male Cost	Female Incidence	Female 5½% Annuity	Female Cost	Female/Male Ratio
Calendar Year 1963							
22	0.5	7.85	3.93	0.3	8.23	2.47	.63
27	0.8	7.60	6.08	0.5	8.02	4.01	.66
32	1.2	7.31	8.77	0.9	7.78	7.00	.80
37	1.8	6.88	12.38	1.5	7.46	11.19	.90
42	2.6	6.36	16.54	2.1	7.15	15.02	.91
47	4.3	5.76	24.77	3.4	6.69	22.75	.92
52	7.8	5.13	40.0	6.0	5.96	35.76	.89
56	14.3	4.06	58.06	10.1	4.56	46.06	.79
62	19.1	1.86	35.53	10.7	1.91	20.44	.58
Weighted Average			24.94			21.18	.85
Calendar Year 1975							
22	1.5	8.91	13.37	0.7	10.78	7.55	.56
27	2.0	9.13	18.26	1.2	10.82	12.98	.71
32	2.5	8.95	22.38	2.0	10.57	21.14	.94
37	3.4	8.59	29.21	3.0	10.02	30.06	1.03
42	5.1	8.07	41.16	4.1	9.27	43.57	1.06
47	7.7	7.33	56.44	6.7	8.41	56.35	1.00
52	13.0	6.39	83.07	11.0	7.27	79.97	.96
57	22.5	4.94	111.15	17.6	5.47	96.27	.87
62	28.8	2.47	71.14	19.0	2.58	49.02	.69
Weighted Average			54.27			51.49	.95
Ratio to 1963 Average			2.18			2.43	
Calendar Year 1975 – Lifetime Disability Annuity							
22	1.5	9.02	13.53	0.7	11.03	7.72	.57
27	2.0	9.29	18.58	1.2	11.21	13.45	.72
32	2.5	9.20	23.00	2.0	11.14	22.28	.97
37	3.4	8.97	30.50	3.0	10.04	32.52	1.07
42	5.1	8.66	44.17	4.7	10.41	49.16	1.11
47	7.7	8.26	63.60	6.7	10.18	68.21	1.07
52	13.0	7.86	102.18	11.0	9.99	109.89	1.08
57	22.5	7.61	171.23	17.6	9.72	171.07	1.00
62	28.8	7.55	217.44	19.0	9.33	177.27	.82
Weighted Average			72.77			73.88	1.02

Railroad Retirement System

Annual rates of immediate disability retirement under the Railroad Retirement System have been developed since 1947, at which time the program covered about 2½ million workers. Currently only about 650,000 active workers are covered. This experience is summarized in Table E. Of interest is the fact that at ages 45 through 60, rates are shown for both occupational disability and total disability. The occupational feature appears to add about 2 per 1,000 to the incidence rates. The occupational rates, however, apply to individuals having 20 or more years of railroad service so that the higher rates not only reflect the liberalization in the definition of disability, but also reflect the higher disablement rates associated with larger benefits.

The Railroad Retirement experience exhibits a somewhat steeper pattern of incidence rates by age than the Social Security system. Taking the 1968-70 experience as compared with the comparable Social Security

experience, the Railroad Retirement rates run from about 100% of the Social Security rates at age 42 up to 133% of the Social Security rates at ages 57 and 62. The Railroad Retirement program provides benefits to individuals who are totally and permanently disabled and who have had more than 10 years of railroad service in the past. Many of these so-called deferred disability cases arise from individuals working in other industries and to the extent that some of them are included in the experience this would serve to increase the disability incidence rate. The incidence rates are based on "immediate retirements" where the date of retirement falls in the same calendar year or the calendar year following the date last worked in the railroad industry.

Retirement in many cases does not commence until after the expiration of Sickness and Accident benefits which generally run for 39 weeks in the case of employees with 10 to 19 years of service and 52 weeks in the case of those with 20 or more years. Thus, the average duration

from date of onset to date of disability retirement is roughly one year.

Railroad Retirement Board Actuarial Study Number 10 also broke out rates of disability by occupational group. Generally, office employees (executives, staff assistants, supervisors and professionals, station agents, clerks, etc.) had disability incidence rates that were about 60% of the total rates. On the other hand, the large group of maintenance employees, including gang foremen, way

and structure craftsmen, shop craftsmen, helpers and apprentices, station and platform employees, etc., have disability incidence rates approximately 130% of the overall rates. Thus, the spread by occupation was in excess of two to one. Only about 5% of the employees eligible for disability retirement benefits were female. Approximately 40% of the disablements were due to diseases of the circulatory system and another 20% due to diseases of the musculoskeletal system.

TABLE E
United States Railroad Retirement System
Actual Rates¹ of Immediate Disability Retirement² During Selected Periods,
by Age and Type of Disability, 1947-73
(Number of Retirements per 1,000 exposed)

Types of Disability	All Ages	Under 40	40-44	45-49	50-54	55-59	60-64
Total disability only ³							
1947	6.3	1.1	3.4	6.1	14.5	26.0	
1948-49	4.4	0.8	1.9	3.5	9.2	16.7	
1950-53	2.8	0.7	1.1	2.6	5.6	11.0	
1954-56	2.1	0.4	1.1	2.4	4.0	8.0	
1957-58	2.5	0.6	1.1	2.5	4.8	8.8	
1959-61	2.5	0.6	1.1	2.2	5.1	8.4	
1962-64	3.0	0.7	1.5	2.5	6.3	11.2	
1965-67	3.1	0.7	1.7	3.2	6.4	13.0	
1968-70	5.7	1.2	2.2	4.0	8.3	18.5	
1971-73 ⁵	8.0	1.1	3.7	5.0	11.0	22.0	
Total and occupational combined ⁴							
1947	25.5			9.8	17.4	30.1	44.1
1948-49	18.3			5.8	11.5	19.9	33.5
1950-53	15.6			4.4	9.0	16.1	28.3
1954-56	16.4			4.4	8.7	16.0	27.8
1957-58	18.4			4.8	9.3	16.5	29.7
1959-61	18.1			4.3	9.0	15.0	30.8
1962-64	16.2			4.7	8.5	15.4	29.3
1965-67	13.0			4.4	7.2	14.1	25.7
1968-70	15.2			6.2	10.2	18.6	28.0
1971-73 ⁵	19.6			8.0	14.0	24.0	40.6

¹Technically, probabilities; age basis is x to $x + 1$.

²Retirements among employees who last worked in the railroad industry in the calendar year of their retirement or in the calendar year immediately preceding.

³Retirements with 10-19 years of railroad service at ages under 60.

⁴Retirements with 20 or more years of railroad service plus all retirements in age group 60-64.

⁵Approximate based on split by 12th Actuarial Valuation breakdowns.

Source: Railroad Retirement Board Actuarial Study Number 10 Table 5 plus experience results in 12th & 13th Actuarial Valuations.

Experience Under Private Retirement Plans

The disability retirement experience under three large private retirement plans was studied using the 1963 male disability incidence rates from Social Security as a standard for comparison. The results are set forth in Table F.

The first pension plan is operated by a large electrical workers' union under which disability retirement is available on terms identical with Social Security but only after twenty years of membership in the union. About 290,000 members are covered by the program of whom

about 90,000 are eligible for disability pension. The experience reflects the added hazards of construction work. The disability retirement provision was first made available at the beginning of 1967 and the first year's experience reflects a "catching-up" in the sense that some members were already qualified for disability but were continuing their beneficial membership until they were eligible for age retirement benefits. About 1,500 members retire on disability each year.

The second plan covers the hourly-paid employees of an auto manufacturer. Disability retirement benefits are

available to employees with 10 years' service after the weekly sickness and accident benefits expire (usually 52 weeks). Alternate benefits are payable from an extended disability program for a period equal to the employee's length of service at disablement if they should prove greater than the disability pension. The pension plan provides disability retirement benefits on an occupational basis, requiring that the employee must be "wholly and permanently prevented from engaging in regular employment or occupation at the plant where he has seniority as a result of bodily injury or disease". In addition to the experience by calendar year based on a 1963 Social Security standard, Table F also shows the percentage of the disability retirees who were not awarded Social Security benefits in a given calendar year. About 490,000 active workers are covered under the plan of whom about 260,000 are eligible for disability pension. About 2,700 disability retirements take place each year. The plan is the subject of collective bargaining and the retirement patterns reflect the employees' expectations

as to the likely level of benefit over the next contract period.

The third plan covers salaried employees of a large employer engaged in light manufacturing. Disability retirement status is available after 10 years' service. Benefits commence at age 65 based on the projection of service during the period of disability up to age 55. Prior to 65 benefits are available from a sickness and accident program (52 weeks) and a total and permanent disability program. Approximately 170,000 salaried employees are covered under the program of whom 95,000 are eligible for disability retirement.

Table F also sets forth, for comparison, the actual to expected ratios for the Social Security program itself and the rate of unemployment in the given calendar year. The coefficient of correlation between the Social Security incidence rate and the unemployment rate is .754 and that between the Social Security recovery rate and the unemployment rate is -.674, both values being significant at about the 1% fiducial level.

TABLE F

Calendar Year	Ratio of Social Security Male Incidence Rate to 1963 Rate	Ratio of Social Security Female Incidence Rate to Male Rate	Social Security Gross termination rates from recovery (per 1,000)	Unemployment rate %	Ratio of Electrical Workers Experience to 1963 Social Security Rate	Ratio of Auto Workers Experience to 1963 Social Security Rate	Auto Workers % not awarded Social Security	Ratio of Salaried Technical Experience to 1963 Social Security Rate
1965	.84	.81	19.4	4.5	—	.92	24%	—
1966	.88	.81	21.9	3.8	—	1.09	14	—
1967	.94	.81	32.1	3.8	1.88	1.10	17	—
1968	1.02	.79	30.0	3.6	1.04	1.34	16	—
1969	1.04	.81	28.0	3.5	1.02	1.62	27	.24
1970	1.18	.78	27.9	4.9	.93	1.75	30	.24
1971	1.30	.78	27.1	5.9	1.06	1.65	27	.19
1972	1.48	.81	22.5	5.6	1.45	1.53	17	.29
1973	1.74	.86	18.9	4.9	1.47	1.54	13	.38
1974	1.73	.87	17.7	5.6	1.52	1.66	14	.51
1975	1.69	.81	16.4	8.5	1.83	2.00	13	.30
1976	—	—	15.4	7.7	1.83	1.94	12	.49
1977	1.70	.82	21.7	7.0	2.04	1.60	17	.51

Practical Applications

The actuary faced with developing costs for a disability retirement provision in a particular private pension plan will normally have inadequate data with which to develop a precise set of incidence rates and costs. Fortunately disability retirement costs run on the order of 10% of age retirement costs so that some approximations are acceptable. The actuary can select some standard table of disability incidence rates, together with the associated annuity values, and then a set of discounts or loadings for the various industries and groups can be adopted to reflect the actuary's judgment as to the anticipated experience in the particular case. For example, Table G shows the disability incidence rates for calendar year 1977 under the Social Security program together with 6% annual values. This table approximately reproduces the incidence rates experienced in the electrical workers' and auto workers programs. For salaried employees, disability

incidence rates in the range of 25% to 50% of this table would appear appropriate.

TABLE G
Basic 1977 Social Security Disability Table

Age	Incidence Rate Per 1,000			6% Life Annuity Values		
	Male	Female	Unisex	Male	Female	Unisex
22	1.4	0.7	1.1	8.58	10.41	10.47
27	1.9	1.2	1.6	8.84	10.59	10.30
32	2.4	2.1	2.3	8.78	10.54	10.06
37	3.4	3.1	3.3	8.58	10.28	9.75
42	5.0	4.6	4.8	8.30	9.94	9.36
47	7.7	6.8	7.3	7.94	9.70	8.87
52	13.0	11.1	12.1	7.64	9.55	8.55
57	22.7	18.0	20.4	7.35	9.32	8.46
62	30.2	19.0	24.6	7.19	8.97	8.16

Where the pension plan is valued on the basis of separate service tables for male and female employees, the disability incidence rates in Table G can be incorporated directly into the service table and the male and female life annuity values at the appropriate interest rate can be taken from Actuarial Study Number 75 which, on the basis of select and ultimate recover and death rates for male and female disabled workers, sets forth annuity values at interest rates from 0% to 6%. As a simplifying alternative, the actuary may assume that disability incidence is not included in the withdrawal decrement of the service table and that accordingly the accrued pension benefit payable after normal retirement age is already incorporated in the valuation of the plan. The incidence rates coupled with temporary annuities payable to normal retirement may then be used directly to develop a one year term cost for the supplemental values attributable to disability.

Where the actuary has used a unisex mortality table, or a single service table, in the evaluation of the basic pension, the unisex incidence rates in Table G may be incorporated into the service table together with the life annuity values. The unisex annuity values shown in Table G are based on the UP-1984 Mortality table at 6% interest multiplied by a factor of 65% up to age 50 increasing by 1% per year to 80% at age 65 and 100% at age 85. These modified annuity values can also be used in determining the liabilities for employees already disabled at the time of valuation. One further approximation, preferred by the author, is to use 70% of the unisex rate and the full UP-1984 life annuity values. Besides being conservative

and simplifying the calculations, this means that an increase in the rate of disablement from the normal level is accompanied by an assumption that the additional disabled lives will have sharply lower recovery and death rates than those meeting a full strict test of disability and this approximation automatically adjusts the disability annuity values to the new higher expected level. Under this approach hourly plans would be valued at 70% of the unisex incidence rate in Table G and salaried groups at 20% to 35% of the unisex rate.

Conclusions

Because of the wide variation in experience from one calendar year to another based upon economic differentials and because of the substantial variation that can result from fairly minor differences in the definition of disability or in its administration, it does not appear possible to set forth rates of disability which will reproduce the actual experience under a particular private retirement program. Disability retirement costs usually amount to less than 10% of total retirement plan costs so that shortcuts and approximations are clearly reasonable. The actuary responsible for developing the most appropriate costs does have available extensive experience from Social Security and Railroad Retirement to draw upon but a substantial degree of judgment is required. From the standpoint of cost, disability retirement under private pension plans appears to be the sort of thing where everything that happens is bad so that some margin for the unrelenting onslaught of reality is highly desirable.