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DISABILITY TERMINATION RATES

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ABSTRACT

The substantial deterioration of experience under individual disability income insurance during the first half of the decade of the 1970s has focused attention on trends and current levels of rates of termination of disability. With respect to individually underwritten policies there has been no intercompany experience since the extensive analysis of ordinary disability benefits in the 1930–50 period.

Available data drawn from group waiver of premium, group disability income, and individual loss-of-time business, as well as disability experience under the OASDI system and from three European countries, are presented, compared, and analyzed to reveal trends and, to the extent possible, underlying causes. The paper presents analysis and interpretation of such limited data as are available with respect to the effect on disability duration of occupational classification, changing distribution of claims by cause, length of deferment, and benefit periods.

The differences in disability termination rates between men and women and possible causes and explanations of these differences are explored in depth. The incidence of recovery rates and death rates, respectively, according to sex are studied. It appears that major differences by sex in the respective levels and incidence of death and recovery resulted, generally, in higher terminations for women in the early years with lower terminations thereafter.

The authors had the benefit of some recent termination data drawn from claims on individual loss-of-time policies and contributed by a number of insurers. From a preliminary analysis of these new data, some comparisons are presented indicating that, in addition to age, duration of disability, and sex, other significant influences can be identified; these include occupational classification, deferment period, and benefit period.

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I. CONCEPTS AND TECHNIQUES

Analysis of Disability Termination Experience Unrelated to Claim Rates

Most published experience with respect to disability termination rates of which we are aware has arisen from comprehensive analyses covering both rates of occurrence of disability and rates of termination. However, the analysis of disability termination rates without a corresponding analysis of disability claim rates is not without precedent. The termination experience under group waiver of premium benefits [5] and studies by the Office of the Actuary in the Social Security Administration [1, 2] are examples. The study of termination rates alone offers some advantages, a discussion of which appears in Appendix II.

Disability Claim Rate: A Compound Factor

A variety of methods have been used for computing premiums, reserves, and other values on the basis of chosen disability experience. Except when only policies with maximum benefit periods of two years or less are involved, it is customary and convenient to develop separate tables of rates of occurrence of claims and rates of termination of compensable disability. From the latter, disabled life annuities or average periods of disability duration can be derived. This approach parallels the widely observed casualty insurance practice of expressing the cost of insurance in terms of two factors, namely, frequency and severity. From this treatment and concept it is natural to infer that the disability claim rates and the average claim duration, or alternatively the disabled life annuity, are independent variables. This, however, is true only for policies without any deferment or elimination period, that is, those that provide benefits from the first day of disablement. Where there is a deferment, and this is the rule, what is called the rate of disability is actually the resultant of the rate of becoming disabled by an accident or sickness and the probability that such disability will persist for at least the number of days of deferment. The abnormally high frequency of claims in the individual policy disability experience of the early 1930s as compared with the normal experience of the 1946–50 period is now seen to have resulted primarily from an increase in continuance rates during the first three months of disablement rather than from a major increase in the frequency of disabling illnesses and accidents. This use of the dual probabilities of frequency and severity is convenient as well as traditional; the discussion to follow is not to be interpreted as a proposal to supplant it. However, it does appear that this frequency-severity treatment has perhaps led to some misconceptions or superficial analyses of causes underlying trends in the disability process. Although perhaps less practical as a

method of actuarial mathematics or procedure, the two contingencies can, for conceptual purposes as well as for analysis in depth, sometimes be replaced advantageously by a single contingency.

Actuaries often have compared different experiences, or have compared an actual experience with tabular values, by computing the respective prevalence values at specific points of duration of disablement. In many situations this has proved to be a powerful method of analysis. Carried to the ultimate, this procedure could be used for all actuarial evaluations. With a complete set of prevalence values, that is, the products of the rates of disability and the probabilities of its continuance to successive points, the annual cost of disability can be determined for any period of disablement covered by the policy.

Another single contingency approach in fact was used in the early analyses of group weekly indemnity insurance [7, 12]. In this method, all claim costs are developed from a distribution table showing the number of claims of exactly t days of duration of compensable disability, for all values of t from 1 up to and including the maximum number of days payable under a policy. The group weekly indemnity data generally have not been analyzed by age, but a family of tables of distribution of disability by length of the compensable period could be developed for successive age groups.

Elements of the Rate of Termination of Disability

Disability terminates either by recovery or by death. In reference to disability insurance, recovery does not necessarily mean complete remission from the disease causing the disability or complete physical restoration following an accidental injury. Insurance policies generally define disability not solely in terms of physical condition or functioning but also with reference to ability to work.

Some of the available tables of disability termination rates, including those based on the 1930–50 experience under disability clauses contained in life insurance policies[1] show separately the rates of recovery and rates of death while disabled. The group waiver of premium disability table [5] is so subdivided, as are the tables produced by the social security actuaries [1, 2]. However, the most recent publication of insurance experience, involving group long-term disability policies [8], does not provide this separation. For most purposes and in connection with most currently offered benefit forms, the separation is not necessary because the effects of death and recovery are identical in impact on the cost of the benefits

[1] The report on this study is cited as reference [4]. For brevity, it will be referred to in this paper as the "1952 study."

provided. However, if under the terms of the policy a periodic benefit will be paid regardless of future changes in the physical status or occupational capability of the insured person, a table of mortality during disability is required.

Mathematical Model of the Incidence of Disability

This paper illustrates some of the uses of a mathematical model of disability, such as the one described in reference [11]. That model was intended not to serve as a disability table but rather to outline the general pattern of relationships within a family of disability tables. Used as a base of reference, a model can facilitate analysis of rates of disability or of termination, by age at disability, duration, occupational class, and other characteristics. The graduation of the observed rates also can be expedited if the rates are first expressed as ratios of the corresponding values according to a model.

In the first stages of the process of examining and analyzing the new experience data mentioned in Section III, the model was used quite extensively, particularly in the identification of parameters that should be evaluated as to their influence on the experience. After completion of the preliminary assessment of the data, it was concluded that the actual experience was of sufficient breadth to serve as a base of reference in the measurement of variations arising from various characteristics of the individual risks.

Standardizing the Termination Rates with Respect to One or More Parameters

In the identification and assessment of parameters other than age and duration that appear to have a significant influence on the rates of disability termination, the technique of standardizing the observed experience with respect to characteristics for which reasonably satisfactory measures could be determined was used extensively. For example, consider the basic subdivision of the data into nine quinquennial age groups and an average of thirty-one duration groupings required for a ten-year select table, if rates are produced on a monthly basis for the first twenty-four months of duration. With 279 possible cells by age and duration, further subdivision such as by sex, occupational class, elimination period, or deferment period obviously would result in a fragmentation of the experience into an unwieldy number of cells, with many not containing a credible volume of experience. Standardization, such as by dividing actual terminations by factors representing the incidence of terminations by age and duration, has the effect of reducing the number of subdivisions according to other characteristics to a manageable number of cells.

European Experience and Practices

Several tables of statistics from European experience are presented in this paper. It should be noted that short benefit period coverage in Europe typically is provided by carriers similar to Blue Cross-Blue Shield organizations. On the other hand, the experience of insurance companies and of social insurance programs almost always involves long deferment periods, with benefits to age 65 or some other specified age. This makes comparisons with North American data on loss-of-time policies somewhat difficult. Also, termination rates for all ages or all durations combined are often used, a procedure that is commented upon in Appendix IV. Despite these limitations, it is believed that the experience from overseas is relevant and useful, especially with respect to differences by sex.

II. TRENDS IN EXPERIENCE

Experience under Individual Policies

No termination rates based on intercompany experience under individually issued disability coverage have been published since the 1952 study. However, the level of recent experience within the first two years of disability may be inferred from the Society's reports on experience under individual loss-of-time policies [6]. While termination rates were not developed, average durations of disability within the first and second years of the benefit period are presented in the reports. The substantial increases in average claim durations shown in Table 1 indicate a sharp reduction in termination rates that apparently commenced with the 1970–71 biennium. Of course, lengthened claim durations signify lower termination rates. A broad overview of Table 1 indicates a relatively small increase in the frequency of claims, with a marked rise in the average duration of claims. Closer examination reveals that for Group I, essentially white-collar, occupations, there was a marked increase in claim rates for ages under 40, while a decrease occurred at the higher ages. For the blue-collar category, Group II, there was an overall 10 percent increase in claim frequencies. Here, too, there was a drop in claim rates at the higher ages except for the seven-day deferment period. The sharp rise in claim rates was confined largely to ages under 30. The average results for all ages shown for Group II in Table 1 were computed using the distributions by age and deferment period of Group I, so that the comparability would not be impaired by differences in these respects. Durations were computed by dividing the annual claim cost by the corresponding claim rate. The Society collects data on policies with deferments longer than thirty days, but these data have not been published,

TABLE 1

INDIVIDUAL LOSS-OF-TIME POLICIES
EXPERIENCE ON MEN—BASED ON AMOUNTS OF MONTHLY INDEMNITY

A. GROUP I

First Year of Benefit Period

AGE GROUP	CLAIM RATE			AVERAGE DURATION IN MONTHS			ANNUAL CLAIM COST PER $1 PER MONTH		
	1966–69	1974–75	% Increase	1966–69	1974–75	% Increase	1966–69	1974–75	% Increase
	7-Day Deferment								
Under 30	.074	.104	41%	1.16	1.87	61%	.086	.194	126%
30–39	.080	.100	25	1.36	2.07	52	.109	.207	90
40–49	.093	.094	1	1.65	2.44	48	.153	.229	50
50–59	.123	.117	− 5	1.98	2.74	38	.243	.320	32
60–69	.144	.150	4	2.68	3.15	18	.386	.472	22
Average	.101	.108	7%	1.81	2.49	38%	.184	.268	46%
	14-Day Deferment								
Under 30	.033	.047	42%	1.64	2.21	35%	.054	.104	93%
30–39	.038	.048	26	1.55	2.33	50	.059	.112	90
40–49	.055	.056	2	1.91	2.50	31	.105	.140	33
50–59	.084	.072	−14	2.36	3.11	32	.198	.224	13
60–69	.105	.111	6	3.00	3.43	14	.315	.381	21
Average	.057	.059	4%	2.08	2.70	30%	.119	.160	34%
	30-Day Deferment								
Under 30	.009	.013	44%	1.89	2.54	34%	.017	.033	94%
30–39	.012	.013	8	2.08	2.85	37	.025	.037	48
40–49	.020	.020	0	2.60	3.15	21	.052	.063	21
50–59	.040	.036	−10	2.82	3.78	34	.113	.136	20
60–69	.067	.063	− 6	3.90	4.10	5	.261	.258	− 1
Average	.021	.021	0%	2.67	3.32	24%	.056	.070	25%
	7-, 14-, and 30-Day Deferment Combined								
Average	.059	.061	3%	1.99	2.65	33%	.118	.163	38%

TABLE 1—*Continued*

A. GROUP I—*Continued*

Second Year of Benefit Period*

Age Group	Claim Rate			Average Duration in Months			Annual Claim Cost Per $1 per Month		
	1965–68	1973–74	% Increase	1965–68	1973–74	% Increase	1965–68	1973–74	% Increase
Under 30	.00105	.00291	177%	9.43	8.69	− 8%	.0099	.0253	156%
30–39	.00113	.00220	95	9.73	8.05	−17	.0110	.0177	61
40–49	.00183	.00442	141	8.96	9.95	11	.0164	.0440	168
50–59	.00439	.00735	67	9.77	10.07	3	.0429	.0740	72
60–69	.00877	.01729	97	10.23	9.62	− 6	.0897	.1663	85
Average	.00253	.00505	98%	9.65	9.62	0%	.0244	.0485	99%

* For second year of benefit period, experience years of incurral are retarded one year, owing to additional time required for development of cost of benefits.

TABLE 1—*Continued*

B. GROUP II

First Year of Benefit Period

Age Group	Claim Rate			Average Duration in Months			Annual Claim Cost per $1 per Month		
	1966–69	1974–75	% Increase	1966–69	1974–75	% Increase	1966–69	1974–75	% Increase
	7-Day Deferment								
Under 30	.128	.144	12%	1.41	1.67	18%	.181	.240	33%
30–39	.122	.141	16	1.56	2.10	35	.190	.296	56
40–49	.127	.144	13	1.79	2.38	33	.227	.343	51
50–59	.154	.162	5	2.19	2.94	34	.338	.477	41
60–69	.179	.188	5	2.77	3.59	30	.496	.675	36
Average	.138	.152	10%	1.95	2.57	32%	.270	.391	45%
	14-Day Deferment								
Under 30	.059	.080	36%	1.73	2.18	26%	.102	.174	71%
30–39	.071	.086	21	1.92	2.53	32	.136	.218	60
40–49	.090	.096	7	2.06	2.83	37	.185	.272	47
50–59	.111	.119	7	2.57	3.18	24	.285	.379	33
60–69	.163	.143	−12	2.88	3.77	31	.470	.539	15
Average	.090	.099	10%	2.22	2.88	30%	.200	.285	42%
	30-Day Deferment								
Under 30	.027	.037	37%	2.15	2.24	4%	.058	.083	43%
30–39	.033	.039	18	2.39	2.85	19	.079	.111	41
40–49	.042	.049	17	2.71	3.27	21	.114	.160	40
50–59	.058	.063	9	3.29	3.90	19	.191	.246	29
60–69†	.094	.079	−16	4.76	4.65	− 2	.447	.367	−18
Average	.042	.048	14%	2.88	3.29	14%	.120	.157	31%
	7-, 14-, and 30-Day Deferment Combined								
Average	.088	.097	10%	2.19	2.77	26%	.192	.270	41%

TABLE 1—*Continued*

B. GROUP II—*Continued*

Second Year of Benefit Period*

Age Group	Claim Rate			Average Duration in Months			Annual Claim Cost per $1 per Month		
	1965–68	1973–74	% Increase	1965–68	1973–74	% Increase	1965–68	1973–74	% Increase
Under 30	.00167	.00270	62%	8.08	9.33	15%	.0135	.0252	87%
30–39	.00196	.00427	118	8.67	9.44	9	.0170	.0403	137
40–49	.00355	.00742	109	9.30	9.38	1	.0330	.0696	111
50–59	.00782	.01635	109	9.62	9.73	1	.0752	.1591	112
60–69	.01602	.02753	72	9.64	9.67	1	.1544	.2661	72
Average	.00460	.00925	101%	9.37	9.57	2%	.0431	.0886	106%

* For second year of benefit period, experience years of incurral are retarded one year, owing to additional time required for development of cost of benefits.

† Based on only 225 claims in 1966–69.

presumably because of the relatively small volume of claims experienced. Table 24 in Appendix III is relevant to this observation.

Overinsurance, created or contributed to by steep increases in social security disability benefits, undoubtedly contributed to the adverse developments depicted by Table 1. This is especially true at the younger ages, where benefits rose disproportionately after the 1972 indexing provisions became effective. In some states, higher state plan benefits also may have added to the prevalence and level of overinsurance.

An unusual increase in claim rates with respect to younger persons also has been noted in the social security statistics. Areas of abnormal increase in the number of claims for disability benefits under the OASDI system have been identified on page 44 of reference [14]. For young men under age 30, disabilities attributed to mental disorders were shown to have increased, from 1967 to 1972, much more sharply than disabilities from all causes. For younger women at these ages, there was a disproportionate rise in disabilities of the musculoskeletal system. If the experience under private disability insurance has followed a similar pattern by diagnosis, the increase in average durations may be explained in part. The causes cited above are among those that often result in prolonged periods of disability.

Table 2 presents a comparison of trends during two periods of economic depression with the experience in what are considered to be times of normal disability experience. The first comparison is with respect to ordinary disability benefits issued with life insurance and all subject to

ninety-day deferment. Prior to the 1950s, only a few insurers issued separate disability policies, and there is no published experience available with respect to these earlier loss-of-time benefits.

Initially one would conclude that the effect of the economic reversals of 1974 on the experience was very different from that of the economic depression commencing in 1929. In the 1930–35 period the increase in claim rates over the normal level was dramatic, while the average increase in 1974–75 was only 3 percent for the white-collar risks, and 10 percent for the blue-collar, as shown in Table 1. There is no evidence that the incidence of accidental injury or of contraction of disabling disease increased in either period, but the policies exposed in the two depression periods differed greatly in character. In the 1930–35 experience 100 percent of the policies provided ninety-day deferment, but in the 1974–75 experience only about 10 percent had deferment periods longer than thirty days. Obviously, lower termination rates after the occurrence of disablement would cause a much greater increase in the number of claims

TABLE 2

INDIVIDUAL DISABILITY EXPERIENCE—COMPARISON OF TRENDS IN TWO ECONOMIC DEPRESSION PERIODS*

AGE GROUP	DISABILITY BENEFITS IN ORDINARY POLICIES WITH 90-DAY DEFERMENT; ACTUAL-TO-EXPECTED RATIOS IN 1930–35 COMPARED WITH 1946–50		LOSS-OF-TIME POLICIES WITH DEFERMENT OF 7, 14, OR 30 DAYS—MEN, GROUP I; CLAIM AND AVERAGE DURATION RATES IN 1974–75 COMPARED WITH 1966–69	
	Claim Rate Experience (1)	Termination Experience (2)	Claim Rate (3)	Average Duration, First Year of Benefit Period (4)
20–29	†	‡	41%	52%
30–39	181%	−16%	22	47
40–49	143	−25	1	39
50–59	64	−21	− 7	36
60–69	.....	.....	3	14

* Basic differences in the form of the published data preclude direct comparisons. Col. 1 displays the excess, as a percentage of the 1946–50 ratio of actual to expected claims, of the corresponding actual-to-expected ratio for 1930–35, the expected being based on the actual experience in 1930–50; col. 2 presents the corresponding comparisons of actual to expected terminations. Col. 3 corresponds to the third column of Table 1, A, and col. 4 corresponds to the sixth column of Table 1. The inverse correlation between cols. 2 and 4 is normal, since the claim duration rises in reflection of decreasing termination rates.

† No claims in 1946–50.

‡ Fewer than 100 terminations in 1946–50.

for policies with ninety-day deferment periods than for policies with seven, fourteen, or thirty days of deferment. We conclude that in all probability the steep increase in claim rates on ninety-day deferment policies in the early 1930s resulted primarily from the deferral of recovery beyond the normal period of recuperation. It also is believed by many observers that a significant number of workers with some latent chronic impairment succeeded, after becoming unemployed, in establishing a claim despite specific policy provisions relating to preexistence. Obviously such claims would represent an increasing percentage of normal claims as the deferment period is lengthened and more of the clear acute disabilities have been terminated.

Experience under Group Insurance

In contrast to the paucity of recent experience relative to termination rates on individual policies, there are extensive data on group long-term disability business. The *Reports Number* includes annually the experience under group long-term disability policies of a number of major group-writing companies, currently thirteen. This experience is shown separately for active lives and disabled lives. The rates of disability claims among active lives have exhibited a rather close correlation to the national rates of unemployment in the United States. The experience on disabled lives has shown a clear trend toward lower termination rates. This has been obscured somewhat, however, by the presentation of the data as cumulative experience since 1962. The Society's Committee on Life and Health Insurance (group) has made available a separation between 1971–75 experience and that for prior years. This separation, shown as Table 3, indicates a sharp drop in termination rates for the last five years, except for the twelve-month deferment policies, which involve a relatively small volume of exposures. The basis of comparison is the 1930–50 experience on ordinary disability benefits: Benefit 2 for the first year of disablement, Benefits 2 and 3 combined for subsequent years. Direct comparisons of ordinary and group experience cannot be made from any published tables. However, inadequacies in loss reserves on noncancelable disability business, so frequently reported by insurers in the first half of this decade, may be compared with the showing in Table 3 that the 1971–75 group long-term disability experience has reflected lower termination rates than the 1930–50 ordinary experience. This comparison suggests that the adoption of the recent group experience as a measure of liability instead of the earlier ordinary experience would have reduced substantially, if not eliminated, the reserve deficiencies.

Table 3 reveals a pattern of termination rates by age and duration

TABLE 3—Disability Termination Experience

Group Long-Term Disability Experience Compared with Benefit 2 Tabular Rates (including benefit 3 after year 1)

Ratio of Actual to Tabular Termination Rate

Sex and Calendar Year of Experience	Age Group					Year of Disablement								Total
	20–29	30–39	40–49	50–59	60–64	1	2	3	4	5	6	7	8	
	3-Month Deferment													
Men:														
1962–70	130%	117%	116%	105%	121%	122%	105%	105%	88%	.....	.....	.....	.....	114%
1971–75	109	107	90	87	92	103	85	80	67	72%	86%	.....	.....	93
Women:														
1962–70	111	115	114	114	90	124	98	78	81	.....	.....	.....	.....	110
1971–75	116	95	90	87	92	102	86	85	61	61	79	.....	.....	92
	6-Month Deferment													
Men:														
1962–70	94%	91%	88%	82%	76%	76%	91%	94%	72%	73%	119%	.....	.....	84%
1971–75	99	82	63	62	59	62	72	70	62	62	62	72	73	66
Women:														
1962–70	111	92	98	79	83	78	95	111	72	67	97	.....	.....	87
1971–75	91	77	70	62	61	68	80	69	48	48	53	42	69	67
	12-Month Dsferment													
Men:														
1962–70	95%	72%	69%	77%	68%	*	72%	72%	75%	68%	103%	.....	.....	74%
1971–75	81	70	70	78	72	*	76	72	76	65	88	.....	.....	75
Women:														
1962–70	64	47	99	68	69	*	75	94	50	73	50	.....	.....	74
1971–75	29	57	99	70	76	*	69	109	52	84	22	.....	.....	74

Source.—Committee on Life and Health Insurance (group), reference [8].

* No benefits payable in first year.

similar to the earlier experience on individually issued policies. However, there is the indication that, in general, the deviation of recent group experience from the pre-1951 ordinary experience becomes progressively adverse with increasing age at inception as well as with lengthening duration of disablement.

United States Social Security Experience

The largest body of disability termination experience ever compiled is that of our social security system [1, 2]. While the characteristics of these data have much in common with insurance experience, the recovery rates under the former are distinctly lower, as will be seen from Table 5 and other comparisons that follow. It should be noted, however, that social security disability awards are conditioned on evidence that disablement has lasted or can be expected to continue for at least twelve months. This requirement obviously eliminates many cases of temporary disability that persist beyond the five-month deferment or elimination period.

Impact of Economic Trends on Termination Experience

When significant changes in the level of recovery rates are presumed to have arisen from a change in the economy, the availability of employment, or a major alteration in the level or character of social benefits for disability, are claims previously admitted affected in the same way as claims arising after the occurrence or culmination of the change in experience? The comparison in Table 4 of data from the 1952 study [4] suggests that claims of all durations are affected with little significant variation by duration, when allowance is made for the volume of experience in each year of duration. This emphasizes the importance of limiting the study of termination rates to the experience period that is considered to be most significant for the purposes of the investigation. It also indicates that the results may lack validity if the exposures do not represent a cross section of claims by duration.

III. THE 1975–76 DISABILITY TERMINATION STUDY (DTS)

An analysis of published data relating to individual loss-of-time policies and statements of a number of actuaries representing important disability insurers made it evident that most of the increase in loss ratios during the 1970s was the result of falling recovery rates rather than rising claim rates. As a result, a number of companies were invited by one of the authors of this paper to contribute informally their experience data of 1975, 1976, or both to a disability termination study (DTS), so that a specialized analysis of recent rates of termination could be made. Approxi-

TABLE 4

COMPARISON OF RECOVERY RATES
BENEFIT 2 (INCLUDING BENEFIT 3 AFTER YEAR 1)

YEAR OF DISABLEMENT	RATIO OF ACTUAL TO EXPECTED TERMINATIONS		RATIO OF (1) TO (2)
	1930–35 (1)	1946–50 (2)	(3)
1	95%	114%	83%
2	93	134	69
3	73	105	70
4	70	110	64
5	79	92	86
6	83%	108%	77%
7	76	99	77
8	84	80	105
9	45	103	44
10	49	75	65
6–10	76%	94%	81%
11–15	49%	77%	64%

SOURCE.—Reference [4].

mately twenty insurers had submitted usable data at the time of the writing of this paper. These companies all granted permission to publish the composite results to illustrate some of the factors that appear to influence the rates of termination. The data in Tables 7, 11, and 13 are derived from contributions to the DTS.

In 1978, after validation of the contributed data and some preliminary analyses had been completed, the Society's Committee to Recommend New Disability Tables for Valuation suggested that the data collected for the informal study and the preliminary analyses be incorporated in the broader project sponsored by the Society. This proposal was accepted gladly. Subsequently other insurers, who had not found it feasible to participate in the informal study from the outset, were able as a result of additional time permitted for submission of data to participate in the broadened project under the aegis of the Society. Among the contributors to the project are four of the six largest writers of individual disability insurance.

None of the DTS data presented in this paper have been graduated or adjusted in any manner, with the exception of a programmed elimination at durations twelve and twenty-four months of some claims that obviously ended because of exhaustion of the benefit period and that had been mis-

coded as terminations by recovery. The analyses of DTS data in this paper are limited to experience on men for the second through thirteenth months of disablement. The analyses for the first month of disablement, for years after the first, and by sex are in the developmental stage.

Table 24 in Appendix III shows the calculated number of policies simulating the active life exposures underlying the DTS. Since the study was based on claims terminated in the period of observation or outstanding at the end of the period, regardless of inception date, the corresponding number of lives exposed to the risk of disability is not known and, as a practical matter, cannot be determined. The "calculated numbers" were obtained by computing, according to the model, the exposures needed to produce the actual claims.

The termination rates experienced in the first year of disability are fairly close to the model rates. This provides further evidence of falling recovery rates in the 1970s, since the model was constructed with the intent of reflecting, after the second year of disability, about 75 percent of the group waiver of premium termination rates, with consistent assumptions for the earlier periods of disability.

IV. ANALYSES BY TRADITIONALLY RECOGNIZED FACTORS INFLUENCING THE TERMINATION RATES

Basic Parameters

Preliminary analysis of the DTS data confirms that a satisfactory table of disability termination rates should recognize at least four characteristics: age at inception of disability or entitlement to benefit payments, duration of disability or disablement, sex, and occupational classification. The evidence and findings with respect to the differences in termination experience between men and women are presented in Section VI. The other three basic parameters will be discussed in this section.

Age at Disablement

The physical ability to overcome disability is usually highest during the earlier years of adult life, when disabilities are generally of an acute rather than chronic nature. Moreover, the motivation to return to work should be much higher among younger people, especially those who have the responsibility of bringing up children or are dedicated to succeeding in their chosen careers. At the younger ages recovery far outweighs death as a cause of termination. With advancing age the relative importance of death increases.

An interesting phenomenon has been noted for social security recipients in the 1972–76 experience. During the first year of benefit payments the

graduated death rate actually decreased for men from age 56 through age 64 and for women from age 49 through age 64. This may be an indication of more liberal claim administration at higher ages.

Duration of Disablement

In the first years of disablement terminations by death and recovery are both at their maximum. Recovery rates fall as disability persists, and decrease virtually to the vanishing point by attained age 62. Death rates of the disabled also decrease for several years, reflecting the survival of the fittest. A minimum death rate is reached when the natural aging process becomes the dominant factor. Thereafter the mortality rates of the disabled rise, causing the total termination rates to increase with duration after reaching the minimum level. This reversal of trend is reflected in the model by its conformity to the customary select and ultimate pattern.

Where it is desired that the table of termination rates be applicable to more than one deferment or elimination period, it seems preferable to measure duration from the date of disablement, that is, the date of injury or inception of disability from sickness. However, if it is necessary to provide for only one deferment period, there are practical advantages in measuring the duration from the date of entitlement to benefits. This has been recognized by the Office of the Actuary, Social Security Administration, in Actuarial Studies No. 74 and No. 75 [1, 2].

Statistics from North American insurance companies showing the pattern of disability termination rates by age and duration may be found in the *Reports Numbers* of the *Transactions* for 1952 [4] and 1968 [5]. A comparison of the model with other experiences is made in Table 5. As the respective experiences have been developed by very different methods and involve different specifications, this table is offered for illustrative purposes rather than as a presentation of strictly comparable termination rates.

Experience by Occupational Class

A consistent pattern by occupational classification has been noted, with the termination rates generally decreasing with increasing occupational risk. The Society's published experience on loss-of-time business [6] indicates quite consistently that average durations are higher for blue-collar workers (Group II) than for white-collar workers (Group I). However, the 1974–75 experience, presented in Table 1, indicates that the average claim duration in the first year of the benefit period for Group II exceeded that for Group I by less than 5 percent.

Further analysis shows that the greatest difference occurs between the least hazardous occupational classification and the next category. The subdivision into the two broad groups used in the Society's studies tends to obscure the actual variation by occupational hazard. For a more detailed analysis, use was made of the data from a special study by the New York Insurance Department, although the experience was less recent. In 1975, experience was called for by the superintendent of insurance to permit the department to make a study of differences in disability experience by sex. This study was in response to a legal action brought by the American Civil Liberties Union protesting the use of health insurance premium rates for women at a level greater than those for men. Reference [9] cites the published results. The New York data [3] were divided into four occupational classifications as compared with the two-group split in the experience published by the Society. The data submitted to the New York department include most of the experience contributed to the studies by the Society's Committee on Health Insurance for the experience years 1968–73. These data were supplemented by contributions from companies that had not participated in the Society's study.

TABLE 5

COMPARISON OF DISABILITY TERMINATION RATES PER 1,000 FOR INDICATED AGE OR AGE GROUP

(Sexes Combined where Not Otherwise Stated)

Year of Duration of Disability†	6-Month Deferment, except OASDI*				12-Month Deferment	
	Model	Group Long-Term Disability, 1971–75	OASDI—Men		Finnish Individual Insurance	Dutch Social Security Claim Year 1970
			1965–74	1973–76		
	Age 45 (1)	Ages 40–49 (2)	Age 45 (3)	Age 45 (4)	Ages 43–47 (5)	Ages 35–49 (6)
1	232	266	121	101	112	89
2	191	146	127	104	76	115
3	108	82	79	70	47	42
4	85	53	58	53	39	47
5	73	39	49	46	37	24
6	65	34	41	38	32	28
7	59	45	43	40	32	.....
8	54	.....	46	42	27	.....
9	50	.....	48	44	.....	.....

*OASDI: graduated values; 5-month deferment effective January 1, 1973, 6-month deferment previously; sixth and later years are from ultimate table.

† Duration is measured from end of deferment period; group long-term disability values were computed from monthly rates for disability year 1 and were derived by interpolation for subsequent years.

TABLE 6

INDIVIDUAL LOSS-OF-TIME POLICIES
NEW YORK EXPERIENCE STUDY, 1972–73
30-DAY DEFERMENT PERIOD—MEN

Average Duration, in Months, First Year of Benefit Period

AGE GROUP	NEW YORK CLASS CODE				RATIO, CLASS 42 TO CLASS 11
	11	21	32	42	
20–29	1.83	2.08	2.17	2.45	134%
30–39	2.30	2.43	2.34	2.88	125
40–49	2.53	2.92	2.75	3.14	124
50–59	2.95	3.18	3.44	3.11	105
60–69	3.78	3.47	3.87	3.87	101

Table 6 indicates that there generally is a substantial difference in the average durations and hence in the termination rates for ages under 50. At the higher ages the variation is relatively small and lacks a consistent trend.

Considerable diversity exists among the disability insurers as to the definition of the occupational classes. The following schedule shows the approximate relationship of the New York codes to those adopted for the DTS and to typical class designations.

OCCUPATIONAL CLASSIFICATIONS

Typical Class Designation	DTS Code*	New York Code	Examples
4A and 3A	0–2	11	Professional, administrative, supervisory, sales, and clerical
2A	3	21	Other nonhazardous occupations
A	4	32	Transportation, manufacturing, farming, building trades, and similar occupations
B	5	42	Mining; forestry; and the more hazardous employment in transportation, manufacturing, and construction
C	6	42	Crop dusting, diving, and some mining and quarrying occupations
D	7	42	Extremely hazardous occupations

* Code 0 applies to superselect risks often designated 4A. For insurers with a 4A class, 3A risks are coded 1; for other insurers 3A risks are coded 2. The number of insureds coded 6 or 7 is negligible in relation to the number of Class B risks.

In the analysis of disability termination data, one is confronted with the complexity of interactive influences affecting the experience. To view the results in terms of any one characteristic often can be misleading.

Table 7 provides a succinct comparison of DTS termination experience in three broad occupational groups: "less hazardous," comprising risks with the most favorable classification, code 0 or code 2; "more hazardous," consisting of codes 5, 6, and 7; and all others, comprising an "intermediate" group.

The preliminary indications of the DTS shown in Table 7 are not inconsistent with the first-year average durations in Table 6. While the differences in termination rates by occupational classification are much less marked than the corresponding differences in claim frequency rates, they certainly appear to be significant.

The group long-term disability experience provides no information regarding the effect of occupation. However, we regard it as comprising predominantly nonhazardous occupations and reasonably comparable to Group I in the individual loss-of-time experience. Table 5 from [8] indicates that, of the total exposures, approximately two-thirds are on groups in which at least 75 percent of the covered persons are salaried

TABLE 7

DISABILITY TERMINATION STUDY BY AMOUNT OF MONTHLY INDEMNITY—MEN
EXPERIENCE BY OCCUPATIONAL CLASS
TERMINATIONS DURING SECOND THROUGH THIRTEENTH MONTHS OF DISABLEMENT

DEFERMENT PERIOD IN DAYS	BENEFIT PERIOD IN MONTHS	OCCUPATIONAL GROUP			
		Less Hazardous	Inter-mediate	More Hazardous	All
	Ratio of Actual Terminations in Indicated Occupational Group to the Total Experience within Each Deferment Period				
7	All	111%	100%	91%	100%
14	All	107	100	92	100
30	All	110	97	97	100
All	All	109	99	93	100
	Ratio of Actual Terminations in Indicated Occupational Group to the Total Experience within Each Benefit Period Grouping				
All	12 or less	111%	100%	96%	100%
All	13–24	115	99	91	100
All	25–60	108	98	98	100
All	Over 60	103	98	86	100
All	All	109	99	93	100

employees, while less than 20 percent of the exposures comprise groups in which half or more of the covered persons are hourly-paid.

Table 8 shows experience based on the Belgian social security system, subdivided between blue-collar and white-collar workers and also by sex. The occupational subdivisions are assumed to be roughly comparable to Groups II and I, respectively, in the Society studies of loss-of-time claims. In the Belgian experience, the data are not split according to attained

TABLE 8

DISABILITY TERMINATION RATES PER 1,000 BETWEEN DURATIONS $t + \frac{1}{2}$ AND $t + \frac{3}{2}$ YEARS BELGIAN SOCIAL SECURITY EXPERIENCE, 1964–71

t	BLUE-COLLAR WORKERS		WHITE-COLLAR WORKERS	
	Men	Women	Men	Women
1	195	214	251	267
2	177	167	210	190
3	163	138	183	139
4	165	133	192	109
5	168	115	189	86
10	163	106	111	96
15	122	107	141	105
20	114	92	90	125
Average annuity value*	4.75	5.18	4.35	5.30

* Approximate disabled life annuity, payable to age 65, for assumed average age of 45 at commencement of payment, with 5 percent interest.

age. This could affect the validity of the comparison, since for females the pension age is lower and the curve of incidence of disability is much flatter than for men. Consequently the average age of women is substantially lower than that of men.

The indications of Table 8 are that blue-collar men experience lower termination rates than their white-collar counterparts for the first five years of duration covered by the comparison. Thereafter their termination rates are somewhat higher, but the higher rates at these longer durations are readily attributable to the excess mortality normally observed in any comparison of the respective occupational groups. For women, significantly lower termination rates in the blue-collar category continue only through the second year. On the average, the subsequent termination experience does not differ materially.

As discussed in Section VI in connection with the OASDI disability

termination experience, there is reasonably close comparability between men and women in white-collar occupations but a great difference in the blue-collar category, since women are rarely engaged in such occupations as mining, quarrying, and other highly hazardous activities.

Separation of Terminations between Recovery and Death

The 1930–50 experience under ordinary disability benefits [4] and the 1955–64 experience under the group insurance extended death benefit provisions of the premium-waiver type [5] are the only North American studies based on insurance experience that separate the terminations between death and recovery. The social security studies [1, 2] also provide this separation. Tables 9 and 17 include some illustrations of the respective incidence of the two causes of termination.

In the European experience, the most detailed and, in many ways, most interesting data are from Finland. Table 9, based on the State Pension Plan, shows a pattern by age and duration not unlike North American insurance experience. Table 10 presents Finnish experience under individual policies. In this presentation the excess of disabled life mortality over population experience is given instead of the actual mortality of the disabled. It is interesting to note that, especially at the longer durations and the higher attained ages, the "excess" often becomes negative. Also, in the Netherlands the opinion is held widely that, after five years of receipt of state disability pensions, mortality is better than population mortality. The heavily impaired lives have died; those who are mainly unwilling to work or unable to find a job enjoy a regular income received without any stress. Reference [13], jointly sponsored by the Association of Life Insurance Medical Directors of America and the Society of Actuaries, presents experience based on records of individuals suffering from various serious disorders, many of which frequently result in disability. In a number of cases it appears that longevity is not materially shorter than that of the general population. A few examples are: coronary heart diseases, especially at ages under 40; angina pectoris among women under age 35; coronary artery bypass; many types of heart murmurs other than organic; neurosis; asthma; and myasthenia gravis with medical therapy.

V. ANALYSIS OF INFLUENCE OF POLICY CONDITIONS ON TERMINATION RATES

Experience by Length of Deferment Period

Within the first two years of disablement, the model reflects an inverse correlation between the level of termination rates and the length of the

TABLE 9

TERMINATIONS OF DISABILITY PENSIONS BY DURATION, CAUSE OF TERMINATION, AND AGE GROUP—MEN AND WOMEN
FINNISH EMPLOYMENT PENSIONS SCHEME, BASIC STATUTORY COVERAGE (TEL-P)
EXPERIENCE OF 1966–74 PER 1,000 OF INITIAL CLAIMS FOR EACH AGE GROUP AT DISABLEMENT

DURATION IN YEARS	AGE GROUP AT DISABLEMENT															
	21–30		31–40		41–50		51–60			61–65			All Ages			
	D	R	D	R	D	R	D	R	P	D	R	P	D	R	P	All Terminations
0	9	11	14	7	14	7	16	3	0	16	2	36	15	4	9	28
1	27	137	37	117	45	56	46	16	0	40	3	188	42	34	46	122
2	13	133	18	81	30	36	34	8	0	27	1	226	28	23	55	106
3	13	83	20	42	26	12	31	2	1	14	3	214	23	11	53	87
4	8	47	19	29	20	10	32	1	0	6	.....	224	20	7	54	81
5	11	35	9	15	24	3	25	1	119	.....	.....	.....	17	4	53	74
6	7	17	12	8	22	1	23	1	91	.....	.....	.....	15	2	41	58
7	5	12	14	9	20	2	21	1	78	.....	.....	.....	14	2	36	52
8	9	9	16	8	16	2	20	1	79	.....	.....	.....	13	2	38	53
All durations	102	484	159	316	218	129	248	34	368	103	9	888	187	89	385	661
All terminations	586		475		347		650			1,000			661			

NOTE.—D = death; R = recovery; P = beginning of old-age pension.

deferment period. The evidence of the new experience on individual policies and that of the group long-term disability experience indicate a somewhat lesser effect in the first two years but a continuation of significant differences even beyond the fifth year. The preliminary findings of the DTS supporting the presence of an inverse correlation between the length of the deferment period and the rates of termination of disability are presented in Table 11.

In Table 3 the group long-term disability experience is compared with the 1930–50 ordinary disability experience. In making these comparisons,

TABLE 10

TERMINATIONS UNDER INDIVIDUAL DISABILITY POLICIES IN FINLAND
MORTALITY AND RECOVERY OF DISABLED CLAIMANTS

Duration of Disablement in Years	Age Group at Disablement							
	18–22	23–27	28–32	33–37	38–42	43–47	48–52	53–57
	Excess Mortality per 1,000							
Men:								
0–4	5.38	7.45	6.42	9.59	16.40	15.48	19.98	15.85
5–9	5.27	8.06	9.48	14.68	18.02	15.85	20.18	18.92
10–14	8.98	3.60	4.46	12.55	28.37	21.49	7.61	−32.53
15–19	− 2.62	− 4.20	0.58	17.21	8.60	3.91	98.83	−47.69
20–24	28.25	3.52	3.26	−20.83	−11.57	−14.57	.....	.....
Women:								
0–4	3.72	5.94	7.66	14.38	9.63	10.67	10.95	5.85
5–9	4.56	5.27	9.45	1.12	4.19	4.60	9.23	14.37
10–14	− 1.05	2.13	11.97	− 0.07	0.76	2.38	23.07	54.93
15–19	15.26	− 2.03	10.18	16.56	0.44	− 5.40	36.15	−12.56
20–24	14.64	− 3.15	− 5.13	− 8.65	.....	.....	.....	.....
	Recoveries per 1,000							
Men:								
0–2	96.30	130.09	122.13	139.46	111.94	84.20	59.15	40.13
3–5	23.97	25.14	23.51	17.14	17.55	10.90	10.97	13.04
6–9	9.77	17.96	13.73	15.68	8.23	10.77	15.12	16.36
10–14	7.38	5.11	4.03	7.31	5.51	16.08	12.77	7.26
15–19	7.91	0.00	4.68	16.97	13.05	1.17	15.38	0.00
20–24	0.00	7.55	23.96	0.00	6.78	0.00	.....	.....
Women:								
0–2	91.60	153.83	147.26	140.49	117.87	85.50	66.47	40.43
3–5	22.60	12.91	25.48	13.65	10.72	9.90	10.66	15.59
6–9	18.52	14.60	6.79	9.37	13.66	5.96	16.87	28.21
10–14	0.00	6.45	31.02	19.92	10.89	0.00	54.17	5.33
15–19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20–24	200.00	0.00	0.00	0.00	0.00	.....	.....	.....

the Benefit 2 table[2] [4] was truncated to drop the additional months eliminated by policies providing for six- or twelve-month deferment, but no adjustment was made for deferment period selection. It may be inferred that such selection accounts, at least in part, for the higher termination rates on business with a three-month deferment. It will be seen that the 1971–75 termination rates on claims with six months of deferment are lower at every age group, and for each of the six duration years available for comparison, than the corresponding termination rates for three-month deferment periods.

There is little evidence of convergence of the six-month and three-month deferment period experiences. However, if one looks only at the

TABLE 11

DISABILITY TERMINATION STUDY BY AMOUNT OF MONTHLY INDEMNITY—MEN
EXPERIENCE BY DEFERMENT PERIOD AND BENEFIT PERIOD
TERMINATIONS DURING SECOND THROUGH THIRTEENTH MONTHS OF DISABLEMENT

Benefit Period in Months	Ratio of Actual Terminations by Deferment Period to Total Experience within Each Benefit Period Grouping			
	7 Days	14 Days	30 Days	All
12 or less...	102%	104%	88%	100%
13–24.....	105	102	93	100
25–60.....	110	107	94	100
Over 60....	110	110	97	100
All....	105%	104%	94%	100%

experience on men in 1971–75 and disregards the fifth and subsequent years of disablement, where the volume of data is becoming rather small, some tendency toward convergence is discernible. In any event, refinements in the treatment of the experience data diminish in importance after about the fifth year of duration. After this point the interest earnings on the funds at current levels of return have more impact on financial results than the rates of disability termination.

Experience by Length of Benefit Period

There is a rather high correlation between the length of the deferment period and the length of the benefit period. In general the shorter defer-

[2] For the second and later years of disablement the "Benefit 2 table" includes also the experience under Benefit 3.

ments are associated with the shorter benefit periods. The estimated distribution of the policies in force by deferment and benefit period for the DTS, given in Appendix III, may be of interest in this respect. The termination rates implicit in the model are not differentiated by length of the benefit period. Policies with long benefit periods are subject to stricter underwriting and are typically issued to persons in occupations requiring high skills or advanced education. These insureds may be expected to have above-average motivation and opportunity to resume work after a disability. In most white-collar positions a significant factor is the possibility of resuming work despite handicaps that might prevent return to a job with a greater demand on physical strength or stamina. These considerations lead to the expectation that termination rates for longer benefit periods should be comparatively higher. However, the subjective

TABLE 12

TERMINATION RATES PER 1,000
SECOND BENEFIT YEAR—MEN

	AGE GROUP			
	20–39	40–49	50–59	60–64
(1) Group long-term disability, 1971–75	20.3	15.4	11.4	9.4
(2) New York study, 1971–72	53.0	48.0	37.0	36.0
(3) Ratio, (1) to (2)	2.6	3.1	3.2	3.8

nature of the disability risk appears to act as a countervailing force. The longer the benefit period the more comfortable a disabled person will feel with the replacement income provided by insurance and the less inclined to make efforts toward rehabilitation. Experience seems to indicate that this influence is the more powerful. Supplementation of insurance by social security benefits payable to age 65 naturally increases the motivation to continue the status of disabled.

Table 12 compares termination rates from the New York study with those from the group long-term disability [8]. The former experience was predominantly on policies with benefit periods of two years or less and deferment periods of thirty days or less, whereas in the group experience coverage to age 65 with three-month or six-month deferment periods is the rule.

A comparison covering identical experience years could not be made from the available published data. Undoubtedly the marked deviations are not entirely due to differences in benefit periods. On the average, the

individual policy business underlying the New York data includes a broader range of occupations. Thus, differences in the occupational mix and the effect of deferment period selection probably account for some part of the differences in termination rates shown in Table 12. Nonetheless, the effect of the benefit period must be an important factor.

The DTS data presented in Table 13 indicate minor and not entirely consistent variations by benefit period. However, more detailed analysis shows that significant deviations from the average occur in the latter months of the benefit period. This is somewhat obscured when the experience for full years of disability duration are examined. The implication is clear that the approaching termination of benefits provides, to those

TABLE 13

DISABILITY TERMINATION STUDY BY AMOUNT OF MONTHLY INDEMNITY—MEN
EXPERIENCE BY BENEFIT PERIOD AND DEFERMENT PERIOD
TERMINATIONS DURING SECOND THROUGH
THIRTEENTH MONTHS OF DISABLEMENT

Ratio of Actual Terminations by Benefit Period Grouping
to Total within Each Deferment Period

DEFERMENT PERIOD IN DAYS	BENEFIT PERIOD IN MONTHS				
	12 or Less	13–24	25–60	Over 60	All
7	104%	99%	102%	96%	100%
14	106	98	103	100	100
30	101	101	102	98	100
All	104%	99%	102%	98%	100%

capable of returning to work or embarking on a rehabilitative career, the motivation to do so before the opportunity to resume employment or to rebuild a professional practice evaporates.

Whether tables of disability termination rates should be differentiated by length of the benefit period may prove to be a controversial issue. However, there is an important and perhaps persuasive consideration. In attempting to develop bases for premiums and loss reserves that are adequate but not redundant, it should be recognized that failure to exclude the excess terminations arising from benefit period selection will overstate termination rates in the early years. This results in a serious understatement of reserves on claims under long-term disability policies that could run for many years.

Conversely, with respect to claims under policies with the shorter benefit periods, the effect of averaging the termination experience on such business with that under long-term disability policies is to understate the termination rates in the latter months of the benefit period, thus creating redundant reserve factors. These, however, would have their principal impact on claims with only short periods to run, and therefore the overall financial effect would not be significant. For the average portfolio of risks, the inadequacy in premiums and reserves for long-term benefits obviously would overbalance the redundancy with respect to the short benefit period policies. To avoid sacrificing the large volume of experience on claims with the shorter benefit periods, the technique of standardization, described earlier in this paper, can be used. Alternatively, those portions of the experience affected by benefit period selection can be eliminated while other portions, not so affected, are combined with experience under longer benefit periods.

Definition of Disability

It may never be possible to make a valid assessment by statistical means of the influence of the definition of disability on termination rates. In practice, the more liberal definitions are usually restricted to risks expected to enjoy favorable morbidity experience. The two influences—liberality of the definition and a lower risk of a disabling sickness or injury —will work in opposite directions. Moreover, the extension of the "own occupation" definition from two to five or more years, or to age 65, is yet too recent to be statistically traceable. The justification often heard for this liberalization is that few if any claims have been observed that have terminated at the time the occupational criterion changed from "own occupation" to "any gainful occupation for which reasonably fitted." This argument overlooks the fact that the impact of this change in the criterion is not limited to the effective date of the change but may be felt throughout the entire "own occupation" period. The question is not how many claims terminated at the end of the "own occupation" period but how many ended earlier because of the claimant's realization that the more liberal criterion was applicable only for a limited duration. The resulting motivation to return to work is similar to the benefit period selection discussed previously.

The unfortunate results of this liberalization in definition can be illustrated by actual examples of claim payments to persons fully engaged in gainful activity while receiving benefits for which there is no need or economic justification and which are financed by additional premiums

paid by hundreds of other policyholders. Lacking specific experience statistics, we offer a pro forma illustrative calculation. Assume that, under a policy with a one-month deferment, one out of one hundred initial claimants manages, by switching to a new occupation and establishing inability to continue in the previous one, to enjoy until age 65 or prior death a disability benefit that otherwise would have been received for only two years. Table 14 shows the resulting increase in the claim values and accordingly in the yearly renewable term premiums.

TABLE 14

HYPOTHETICAL CALCULATION OF INCREASE IN CLAIM COSTS UNDER THE "OWN OCCUPATION TO AGE 65" DEFINITION COMPARED WITH THE "OWN OCCUPATION FOR TWO YEARS" DEFINITION*

Age	Value of Claim, per Unit of Annual Indemnity,† "Own Occupation for Two Years" Definition (1)	Annuity Value, Active Life Mortality† (2)	Value of Claim, per Unit of Annual Indemnity, "Own Occupation to Age 65" Definition [0.99×(1)+ 0.01×(2)] (3)	Percentage Increase in Yearly Renewable Term Premium (4)
25	.3482	17.372	.5184	48.9%
35	.3679	15.440	.5186	41.0
45	.4508	12.421	.5705	26.6
55	.6221	7.852	.6944	11.6

* One claim per 100 is assumed to result in benefits to age 65 to a claimant who changes to a different occupation after inception of disability.

† Incidence, termination, and active life mortality rates based on model; 5 percent interest, benefits to age 65.

The resulting increase in the yearly renewable term premium would not be reduced greatly if substantial extra mortality were assumed instead of standard mortality. The salient point is that there is virtually no prospect of recovery during the benefit period of the policy.

Impact of Rehabilitation Benefits and Provisions

Here again, no statistics are known to be available to assess the impact of rehabilitation provisions on termination rates. The economic test of a rehabilitation benefit is based on whether its cost can be offset by earlier terminations. Although the effect on underwriting results can be reckoned in monetary terms, insurers should place a high value on the contribution to the quality of life of the claimant and the advantages to society arising from successful rehabilitation.

Policy provisions that will encourage the insured to engage in a new occupation are more likely to yield positive results than payments made while the insured is engaged on a part-time basis in his own job. The danger is great that the latter may take on the character of a partial benefit of a permanent nature. Such a benefit is more likely to encourage the claimant to enjoy early retirement rather than resume gainful activity on a full-time basis.

VI. INFLUENCE OF SEX ON TERMINATION RATES

Disability Cost Comparisons by Sex

The New York study [9] to which we have alluded showed, for ages under 60, clearly higher disability annual claim costs for women than for men. This confirmed the experience under loss-of-time policies published by the Society. From Table 16 it will be seen that, for the first disability year and for ages 30–59 in the second year, the average claim durations are significantly lower for women. Hence, it can be concluded that, except at the upper ages, the larger annual claim costs for women result from substantially higher claim incidence rates mitigated somewhat by the lower average durations.

On the other hand, it was shown in Table 3 that for all ages and years combined there was no appreciable difference by sex in the recent termination experience under group long-term disability business. It therefore must be concluded that, if women have higher termination rates in the first two years of disability, the level in later years must drop below that of men. Additional evidence to be presented shows this to be the usual pattern.

North American Experience

The findings in the 1952 study with respect to differences by sex were summarized as follows: "It will be seen that the female experience was approximately equal to that for males and females combined for the income benefit studies while for the waiver benefit there appears to be a distinctly lower termination rate for women" [4]. Table 15 reflects the 1930–50 experience as set forth on page 126 of the 1952 study. It will be noted that, other than for Benefit 5 (the waiver-of-premium-only experience), termination rates for women were higher than for men in the first two years of disablement and lower thereafter. Under Benefit 5, the women's termination rates were lower in all years. There is, however, one similarity to the other experience; the "W/C ratio" was lower after the first three years of disablement than during the initial three years, a universal characteristic of all experiences examined. The notation W/C

is used to indicate, for various functions, the ratio of the value for women to that for the sexes combined. Similarly, W/M is used for the corresponding ratio of women's to men's experiences.

Other than the above material, the only published data that are relevant to the bearing of sex on termination rates and that are derived from individually issued policies are to be found in the Society's reports on loss-of-time business. These reports show by sex the average duration of compensated disability for the first year of the benefit period. For the second year of the benefit period only the statistics for men are presented, but the data made available by the New York Insurance Department [3] permit similar comparisons for the second year. A summary of the com-

TABLE 15

RATIOS OF WOMEN'S TERMINATION RATES TO THOSE FOR BOTH SEXES BASED ON THE 1952 STUDY OF 1930–50 EXPERIENCE

BENEFIT TYPE	YEAR OF DISABLEMENT			
	First	Second	Third	Fourth or Later
Benefits 2 and 3 (income)	101%	115%	90%	85%
Benefit 4	104	109	81	92
Benefit 5 (waiver only)	83	87	85	78

parisons from these sources is shown in Table 16. With few exceptions, the average durations in the first two years of disability are lower for women than for men, indicating higher termination rates in those years.

The 1970–72 experience appearing in the D section of Table 16 is for class code 11, the classification including professional, administrative, clerical, and other nonhazardous occupations. Code 21, equivalent to the class 2A of many insurers, covers the remainder of Group I. The comparison for code 21 is not presented, since relatively few women were so classified. However, the comparisons by sex were not inconsistent with the results from code 11.

On the group side, the Society for some years has been publishing annually the termination experience of the major writers of group long-term disability insurance. Table 3 summarizes the results for the latest five experience years and the nine preceding years. Since group long-term disability coverage is issued for the most part to white-collar employees, the exposures are reasonably homogeneous as between men and women.

OASDI Experience

The United States social security disability experience differs from all private insurance disability experience in that, from the first benefit payment and in each age-duration cell, women's termination rates are lower than those for men. Only the Benefit 5 waiver-only experience presented in the 1952 study shows a similar relationship. Waiver-only experience prior to the introduction of social security cash benefits for disability must be regarded as irrelevant in the current scene. With few exceptions, those insured under Benefit 5 prior to 1951 had no disability income benefits from any source and, therefore, had every incentive to return to work.

TABLE 16

INDIVIDUAL LOSS-OF-TIME EXPERIENCE IN NONHAZARDOUS OCCUPATIONS—NORTH AMERICA

Average Duration of Disability in Months

Age Group	Men	Women	W/M Ratio	Age Group	Men	Women	W/M Ratio
	A. 7-Day Deferment, First Year; 1974–75 Experience, Group I				C. 30-Day Deferment, First Year; 1974–75 Experience, Group I		
Under 30	1.87	1.48	79%	Under 30	2.54	1.79	70%
30–39	2.07	1.71	83	30–39	2.85	1.89	66
40–49	2.44	2.02	83	40–49	3.15	2.70	86
50–59	2.74	2.22	81	50–59	3.78	3.08	81
60–69	3.15	1.87	59	60–69	4.10	3.34	81
Average*	2.49	1.96	79%	Average*	3.32	2.56	77%
	B. 14-Day Deferment, First Year 1974–75 Experience, Group I				D. 7-Day Deferment, Second Year; 1970–72 Experience, Code 11		
Under 30	2.21	2.22	100%	Under 30	7.77	8.05	104%
30–39	2.33	2.21	95	30–39	8.14	7.08	87
40–49	2.50	2.46	98	40–49	8.51	8.09	95
50–59	3.11	2.75	88	50–59	9.13	8.01	88
60–69	3.43	2.64	77	60–69	9.45	10.35	110
Average*	2.70	2.45	91%	Average*	8.87	8.14	92%

SOURCES.—A, B, and C: reference [6]; D: reference [3] (New York data).

* Averages are computed by the method described for Table 1.

Today, virtually all workers have at least social security or some other governmental protection.

With respect also to disability claim incidence rates, the actuarial studies published by the Social Security Administration show results by sex that differ considerably from the results under insurance experience. On pages 58 and 59 of reference [9] it was indicated that nearly two-thirds of the women who qualified for disability benefits under OASDI were in nonhazardous occupations classified as professional, technical, managerial, clerical, or sales as compared with 43 percent of the men. Occupations and industries classified as hazardous accounted for 20.5 percent of the men but only 0.5 percent of the women. All other occupations accounted for 36.5 percent of the men and 33.5 percent of the women. Thus there is a marked difference in the occupational mix between employed men and women. Women, on the average, are exposed to a much lower level of occupational hazard. In comparing group long-term disability experience with the disability experience under OASDI, it should be kept in mind that under the former there is much less difference between the sexes with respect to the occupational hazard.

As previously stated, the DTS data show that disability termination rates are at their highest when the occupational hazard is minimal. In the absence of other influences one therefore would expect to see, under the OASDI experience, W/M ratios at a higher level than under the insurance experience. Since the opposite is indicated, we must look for other explanations for the marked departure from the norm in the social security termination data by sex. One possible reason for such low termination rates for women is that, since women's earnings are lower on the average, the regressive benefit formula of OASDI generally creates higher replacement ratios for women than for men; this results in a relatively greater incentive to prolong claims. Also, the disability benefits of married women, which are high in relation to their earnings, are further enhanced when the couple's joint taxable earnings put them in a comparatively high tax bracket. A recent study by the Social Security Administration shows that the replacement ratio, on an after-tax basis, for a worker with two or more dependents is increased by as much as 60 percent if the disabled person's spouse has a yearly earned income of $6,000. Census Bureau data indicate that, in over half of the husband-wife families where the husband is under age 65, both spouses are working.

In Table 17 the disability experience under the United States social security system is shown by age for the third year of disability and by duration for age 50. These two cross sections are reasonably representa-

TABLE 17

COMPARISON BY SEX OF RECOVERY, DEATH, AND TOTAL TERMINATION RATES—SOCIAL SECURITY DISABILITY BENEFITS, UNITED STATES
OASDI TERMINATION RATES PER 1,000—BASED ON 1973–76 EXPERIENCE
6-Month Deferment Period on Awards Prior to 1973; 5-Month Deferment Period Thereafter

		Third Year of Disability								Age at Disability—50					
Sex	Age*	Recovery Rate (1)	W/M† (2)	Death Rate (3)	W/M† (4)	Termination Rate‡ (5)	W/M† (6)	Sex	Year§	Recovery Rate (7)	W/M† (8)	Death Rate (9)	W/M† (10)	Termination Rate‡ (11)	W/M† (12)
M	20	90.2	.63	13.7	1.17	103.9	.70	M	1	13.5	.64	90.6	.81	104.1	.79
W		56.6		16.0		72.6		W		8.7		73.4		82.1	
M	25	78.3	.59	16.6	1.09	94.9	.68	M	2	32.4	.65	58.8	.78	91.2	.73
W		46.5		18.1		64.6		W		21.2		45.6		66.8	
M	30	69.4	.56	20.6	.97	90.0	.65	M	3	15.2	.76	49.2	.64	64.4	.67
W		38.9		20.0		58.9		W		11.5		31.6		43.1	
M	35	59.5	.57	25.5	.88	85.0	.66	M	4	7.8	.71	47.8	.57	55.6	.59
W		34.0		22.4		56.4		W		5.5		27.3		32.8	
M	40	45.1	.64	32.0	.81	77.1	.71	M	5	4.5	.64	48.0	.56	52.5	.57
W		28.8		25.9		54.7		W		2.9		27.1		30.0	
M	45	29.4	.72	40.8	.73	70.2	.73	M	6	2.0	.85	46.3	.60	48.3	.61
W		21.3		29.7		51.0		W		1.7		27.8		29.5	
M	50	15.2	.76	49.2	.64	64.4	.67	M	7	1.8	.83	48.9	.58	50.7	.59
W		11.5		31.6		43.1		W		1.5		28.6		30.1	
M	55	7.1	.73	57.1	.59	64.2	.60	M	8	1.6	.75	51.6	.57	53.2	.58
W		5.2		33.6		38.8		W		1.2		29.5		30.7	
M	60	2.7	.59	64.6	.56	67.3	.56	M	9	1.4	.71	54.2	.56	55.6	.57
W		1.6		35.9		37.5		W		1.0		30.5		31.5	

* Age = calendar age at entitlement.
† W/M = ratio of women to men.
‡ Termination rate = combined rate of recovery and death.
§ Year = year of disability; values for years after 5 are ultimate, dependent only on attained age and sex.

tive of the complete tables as published in Actuarial Study No. 75 [1]. It will be seen that the ratios of recovery rates of women to those of men exhibit a generally increasing trend both by age and by duration of disability. The corresponding W/M ratio with respect to death terminations decreases with advancing age without exception and decreases by duration for the first five years.

European Experience

The data from European sources reinforce the evidence of the higher recovery rates experienced by women in the early durations. Of all the experience reviewed, only that from Finland shows terminations separated between death and recovery as well as by sex. Table 10 indicates more recoveries by women for the first three years of duration for all but the youngest age group. For subsequent years of duration recoveries by women appear to be generally lower. From the Belgian data in Table 8, it can be seen that the W/M ratios exceed unity only in the earliest year reported and that thereafter they are lower.

W/M Relationship in Disability Termination Experience

In all the termination rate experience that has been studied there has been a similarity in the pattern of the W/M ratios. The common characteristic is a distinct drop in the W/M ratios based on total terminations after the first, second, or third year of duration, or at more than one of these points.

With the exception of the United States social security disability experience and the pre-1951 Benefit 5 experience, another "law" has been observed: the W/M ratio based on total terminations exceeds unity in at least one of the first three years of disability or disablement, after which it is always less than unity. Our data for individual loss-of-time policies do not provide any information beyond the second year of the benefit period, but the lower average durations of disability for women clearly imply W/M termination ratios of more than unity for the first two years. If we assume that the individual policy experience after the second year parallels the group experience, the patterns described above are seen to apply generally.

The 1973–76 experience of the OASDI system indicates that, except for a majority of the cells below attained age 37, disabled women have substantially lower mortality than men. Since all insurance experience in the private sector shows that women exhibit higher total termination rates in one or more of the first three years of disablement, it can be

inferred that their recovery rates are significantly higher than those of men in the early years.

In Table 18 all the experience studies that were reviewed are summarized with respect to their conformance to the universal characteristics expressed above. There is a sharp drop in W/M ratios at some point(s) within the first three years of duration, and, except for social security experience in the United States and the pre-1951 Benefit 5 experience, the W/M ratios drop from more than 1 to less than 1 at a point within these early years. The only W/M ratios that could be expressed separately for recoveries and deaths are those based on the group premium-waiver benefits and the social security disability coverage in the United States. Both of these coverages were designed for permanent or prolonged disability, but the group premium-waiver benefit provided for the presumption of permanence after a nine-month elimination period. However, annual proof of continuing disability is required for subsequent benefit years. It will be noted from Table 18 that the W/M ratio based on recoveries under the group premium-waiver benefit actually is higher after the first three years. In the social security experience the reduction at the longer durations is minimal, and in the experience from Finland it is relatively small.

From the fragmentary evidence provided by the group premium-waiver, the Finnish, and the social security experience (if the explanation of the lower W/M recovery ratio that was given for the latter data is accepted), it may be deduced that disabled women appear to enjoy more favorable experience than men with respect to both recovery and death. It also appears that the W/M recovery ratio is fairly stable by duration but that recoveries fall rapidly with the passage of time. On the other hand, both the mortality rates and the related W/M ratios fall for at least five years of disability; at some point thereafter the disabled life mortality rates begin to rise. This combination of trends normally produces total termination rates that are greater for women than for men in the early years of disablement but lower in the later years.

VII. ANALYSIS OF DISABILITY INCIDENCE AND TERMINATION RATES BY CAUSE

The 1952 study contains an analysis by cause of disability, but no subsequent studies of experience of North American insurance have subdivided the data by cause. Quite extensive analyses of the social security data are available, however [10]. Comparisons of the latter with the Dutch experience suggest that more attention might well be paid to the statistical analysis of disability experience by cause.

TABLE 18

COMPARISON OF WOMEN'S TERMINATION RATES WITH THOSE FOR MEN AND WITH THOSE FOR SEXES COMBINED

(W/M or W/C Ratio, as Indicated in Column 3)

DESCRIPTION AND SOURCE	EXPERIENCE YEARS	DEFINITION OF		AGE	INDICATED YEAR OF DISABILITY OR DISABLEMENT				
		Year*	Ratio		First Year	Second Year	Third Year	First Three Years	Fourth Year and Later
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I. Ordinary disability benefits [4]	1930–50	T	W/C	All					
Benefits 2 and 3					101%	115%	90%	103%	85%
Benefit 4					104	109	81	102	92
Waiver benefits—Benefit 5					73	87	85	81	78
II. Individual loss-of-time—Table 15	1974–75	Y	W/M	All	†	†			
III. Individual disability policies, Finland, recoveries only—Table 10		NS	W/M	All				105	95
IV. Group premium-waiver [5]	1955–64	T	W/M	All					
Recoveries					66‡	94	118	100	106
Deaths					127‡	93	68	88	52
Total terminations					107%‡	94%	87%	93%	63%
V. Group long-term disability [8]	1971–75	T	W/M	All					
Six-month deferment					110%	111%	99%	109%	80%
Three-month deferment					99	101	106	101	89
VI. Social security: Belgium—Table 8	1964–71	NS	W/M	All					
Blue-collar workers					NS	122	95	110	78
White-collar workers					NS	106	90	99	69
VII. Social security: United States [1]	1973–75	Y	W/M	50					
Recoveries					64	65	76	68	66
Deaths					81	78	64	75	56
Total terminations					79%	73%	67%	73%	57%

* T = years of disablement, from inception of disablement; Y = years of disability, from end of deferment period; NS = not stated.

† W/M ratios for first and second years exceed 100 percent, since average durations for women are lower (Table 1).

‡ Fourth quarter only; less than 1,000 life years exposed.

While it has been publicized widely that high replacement ratios in the OASDI system result in many cases in benefits exceeding the net income loss, the corresponding program in the Netherlands provides even more liberal benefits on the average. There the government program replaces, for the great majority of workers, 80 percent of former earned income. (Up to 21.5 percent of salaries are deducted for social security contributions.) Although the disability benefits in the Netherlands and throughout Europe generally are subject to income tax, the benefit is clearly a generous one. This, in our opinion, is one of the most important influences that give rise to the very high incidence of compensated disability. Cancer, which can be determined objectively, ranks comparatively low as a cause of disability in the Netherlands (see Table 19). Diseases of the circulatory system, while above the level observed in the United States,

TABLE 19

COMPARISON OF INCIDENCE OF DISABILITY FROM CERTAIN CAUSES SOCIAL SECURITY SYSTEMS IN THE UNITED STATES AND THE NETHERLANDS

Cause or Diagnosis	Relative Incidence		Cause or Diagnosis	Relative Incidence	
	United States	Netherlands		United States	Netherlands
All causes	100	353	Musculoskeletal system	100	561
Cancer	100	81	Mental disorders	100	504
Circulatory system	100	175			

are relatively low in relation to the higher general incidence of disability in the Netherlands. In contrast, the more "subjective" causes, which are difficult to evaluate and to prove or disprove, show very high rates of incidence.

The above comparison suggests that much can be learned about the operation of a disability program through the observance of the distribution of claims by cause. An unusually high incidence of the more subjective causes such as mental disorders and disorders of the nervous system or of the musculoskeletal system may indicate the presence of significant overinsurance, poor underwriting selection, or ineffective claim administration. Analysis of claims by major diagnostic group and of the distribution within each group by length of the compensable period of disability could be an effective instrument in the monitoring of claims and the assessment of the quality of the claim administration. As an example, distributions of claim durations by cause could be developed from the

files of several insurance companies for the more common causes and for other causes creating special problems or resulting in particularly long durations. From such a distribution a determination could be made of the elapsed duration of disablement at which, say, 25 percent of the cases in each major diagnostic group were terminated. This might be taken as a target date, and the claim review could be based on the fact that, by the end of this time period, recoveries should be occurring with substantial and increasing frequency. Causes or diagnoses could be grouped in such a way that a reasonable number of categories, say, 15–25, would embrace nearly all claims.

Although the dates for the successive reviews of any claim should be determined by the claim examiner's judgment after appropriate consultation with a medical officer, the distribution described could well serve as a guide and control. After the first review, further special checkpoints might be established, for example, at the median, the third quartile, and the ninetieth percentile. In addition to their use in scheduling claim reviews, these distributions also could be used to educate the claimant, his or her personal physician, and the family as to the probable course of the disability. If all are informed at an early point that 25 percent recover by the indicated number of days and that the majority recover within a further specified period, a positive mental attitude toward recovery should be established in the minds of the claimant, the physician, family members, and the employer. Based on an accumulation of case histories, these timetables could be expanded to show typical stages of medical and therapeutic treatment. Any evaluations as to the need and feasibility of rehabilitation procedures also could be recorded, with the progress through each phase in the rehabilitation process documented adequately. A claim-handling system along these lines has been operated successfully for some years under the California workmen's compensation plan. Wider knowledge of the experience of all organized programs to promote rehabilitation and monitor the recovery process could be of benefit to private insurers and to those insureds assisted in achieving early recovery or rehabilitation.

Evaluation of a Portfolio of Disability Policies

The measures of disability experience generally available are far from satisfactory as a basis for making valid and credible evaluations of the quality of a portfolio of disability business. The loss ratios developed in the Annual Statement, including those in the Accident and Health Policy Experience Exhibit, are faulty indicators, especially for level premium policies continuable for many years. Not all companies calculate regularly

the actual disability claim rates, termination rates, or average claim durations for direct comparison with the assumptions underlying the premiums. In any event, the long period of time often required for the termination of disability claims and the accurate determination of their cost can give rise to a considerable lag time before the actual underwriting experience is known. To avoid or minimize the lag, claim reserves can be employed to measure the ultimate cost of pending claims, but the record shown by Schedules H and O in the Annual Statement indicates that many companies have not been particularly successful in establishing adequate loss reserves.

A comparison of actual with normal distributions of claims by major diagnostic groups should be helpful in evaluating a portfolio of disability policies. If it were found that such causes as disorders of the musculoskeletal system or of the mental and nervous systems are significantly above the norm, it may be inferred that the business has been poorly selected and contains an undue number of insureds inclined to malinger. It also may indicate that the claim administration has not been particularly effective. Such an analysis of an insurer's business, subdivided by region, state, agency, or other units, also might be helpful for appraising the quality of field and home office underwriting and of claim administration.

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APPENDIX I

MODEL CALCULATIONS OF CHANGE IN TERMINATION RATES

In this appendix the impact of changes in termination rates will be illustrated on the assumption that the prior experience was represented by the disability model. Table 20 illustrates, for age 25 at disablement, the dramatic effect of a 25 percent reduction in termination rates. After ten years of disability, the number of remaining claimants is 50 percent higher under a six-month deferment period policy and is multiplied by 2.8 under a one-month deferment period policy. For higher ages the effect of course would be less drastic, since successive disability persistency rates are compounded over a shorter period; also, recovery rates fall with advancing age.

The result is affected, especially in the first year of disablement, by the unit of time selected. In these calculations, monthly rates were used for the first two years of disability, quarterly rates for the next three years, and annual rates thereafter, with the 25 percent reduction factor applied uniformly to each rate involved in the calculation.

A similar calculation illustrates how a reduction in termination rates in the first few months can increase claim rates under longer deferment period policies, as discussed in Section II. The illustration in Table 21 was developed on the assumption that prevalence rates would not depend on the deferment period, an assumption contradicted by the DTS and group long-term disability experience but adopted here in the interest of simplicity. Assuming identical numbers of disabled persons on the eighth day of disablement, the incidence rates at duration 3 months are increased by 44 percent for age 60 and 126 percent for age 25 at disablement. Table 22 reveals the effect on premium levels of a 50 percent reduction in termination rates.

TABLE 20

RUNOFF OF CLAIMS WITH 100 PERCENT AND 75 PERCENT OF STANDARD TERMINATION RATES

Age 25 at Disablement

Duration of Disablement	1-Month Deferment Period				6-Month Deferment Period			
	Prevalence Rate per 1,000		Increase in Remaining Claimants Due to Change from 100% to 75% Rates of Standard Termination		Prevalence Rate per 1,000		Increase in Remaining Claimants Due to Change from 100% to 75% Rates of Standard Termination	
	100% of Standard Termination Rates (1)	75% of Standard Termination Rates (2)	Per 1,000 Claims at End of Deferment Period (3)	As Percentage of Expected Claims at Indicated Duration (4)	100% of Standard Termination Rates (5)	75% of Standard Termination Rates (6)	Per 1,000 Claims at End of Deferment Period (7)	As Percentage of Expected Claims at Indicated Duration (8)
1 month	1,000	1,000						
2 months	491	618	127	26				
6 months	138	250	112	81	1,000	1,000		
Years:								
1	80	167	87	108	673	717	44	11
2	57	130	73	127	491	566	75	20
5	38	95	57	152	324	415	91	33
10	25	70	45	180	212	302	90	48
20	14	45	31	226	118	196	78	73
30	9	33	24	263	77	142	65	93

TABLE 21

RELATIONSHIP BETWEEN TERMINATION RATES AND CLAIM RATES AT LONGER DEFERMENT PERIODS ASSUMING NO CHANGE IN INCIDENCE OF DISABILITIES AT END OF DEFERMENT PERIOD

DURATION	AGE 25 AT DISABLEMENT			AGE 60 AT DISABLEMENT		
	Prevalence Rates per 1,000 Based on			Prevalence Rates per 1,000 Based on		
	100% of Standard Termination Rates (1)	50% of Standard Termination Rates (2)	Ratio of (2) to (1) (3)	100% of Standard Termination Rates (4)	50% of Standard Termination Rates (5)	Ratio of (5) to (4) (6)
7 days	77.3	77.3	1.00	178.6	178.6	1.00
30 days	30.3	40.2	1.33	111.3	126.8	1.14
3 months	6.2	14.0	2.26	49.8	71.7	1.44
6 months	2.1	6.6	3.07	29.1	48.4	1.66

TABLE 22

INCREASE IN PREMIUM LEVELS DUE TO REDUCED TERMINATIONS

AGE AT ENTRY	7-DAY DEFERMENT PERIOD			6-MONTH DEFERMENT PERIOD		
	Net Level Premium per $100 Monthly Indemnity			Net Level Premium per $100 Monthly Indemnity		
	100% of Standard Termination Rates (1)	50% of Standard Termination Rates (2)	Ratio of (2) to (1) (3)	100% of Standard Termination Rates (4)	50% of Standard Termination Rates (5)	Ratio of (5) to (4) (6)
25	$27.114	$171.308	6.32	$11.389	$16.453	1.44
50	70.924	260.83	3.68	36.912	40.463	1.10

APPENDIX II

CHOICE OF PERIOD OF OBSERVATION

Table 4 shows that external influences such as an increase or decrease in unemployment appear to affect claims of long duration almost to the same degree as more recently incurred claims. It is important that the claims to be included in a study of termination rates be determined in such a manner that there will be no distortion of the results should such a change occur during the period of observation. For example, consider Method A, under which all claims terminating in the years 1973–76 are included regardless of the year of incurral,

TABLE 23

NUMBER OF EXPOSURE YEARS, 1960 AND LATER ISSUES

	Year of Disability						
	1	2	3	4	5	6 and Over	All
	Total Exposure Years						
Method A	4	4	4	4	4	42	62
Method B	4	3	2	1	0	0	10
	Exposure Years of High Unemployment (1975 and 1976)						
Method A	2	2	2	2	2	23	33
Method B	2	2	2	1	0	0	7

and Method B, under which only claims originating during the period of observation are included.

Table 23 shows the substantial difference between the methods. It also illustrates the possibility of biased results if conditions change significantly within the period of observation. For example, the average unemployment rate in 1973–74 was approximately 5.3 percent; in 1975–76 it was 8.1 percent. Under Method B, 70 percent of the exposure years would be years of high unemployment, whereas under Method A these years represent only 53 percent of the total. The limitation to issues after 1959 was adopted empirically and has no bearing on the comparison between the two methods.

APPENDIX III

EXPOSURES UNDERLYING THE DTS

Table 24 shows the estimated active life exposures underlying the disability termination study.

TABLE 24

NUMBER OF EXPOSED POLICY YEARS REQUIRED TO PRODUCE ACTUAL CLAIMS OF DURATION ONE MONTH OR LONGER (MEN ONLY) BASED ON DISABILITY RATES ACCORDING TO DISABILITY MODEL

(In 1,000's of Policy Years)

DEFERMENT PERIOD IN DAYS	DTS CODE	AGE GROUP					
		20–29	30–39	40–49	50–59	60–64	20–64
7	0–2	2	5	8	15	7	37
	3	2	5	7	11	4	29
	4	6	12	18	23	9	68
	5–7	1	4	5	5	2	17
	All	11	26	38	54	22	151
14	0–2	8	15	19	18	5	65
	3	9	9	7	6	2	33
	4	16	21	14	10	3	64
	5–7	7	7	4	3	*	21
	All	40	52	44	37	10	183
30	0–2	25	69	82	66	19	261
	3	8	20	19	17	5	69
	4	19	23	16	10	2	70
	5–7	8	7	5	3	*	23
	All	60	119	122	96	26	423
90	0–2	5	15	20	14	3	57
	3	1	3	2	2	*	8
	4	1	2	1	2	*	6
	5–7	*	*	1	*	*	1
	All	7	20	24	18	3	72
All	All	118	217	228	205	61	829

APPROXIMATE DISTRIBUTION OF POLICIES BY BENEFIT PERIOD

DEFERMENT PERIOD IN DAYS	BENEFIT PERIOD				
	1 Year	2 Years	5 Years	Over 5 Years	All
7	22%	63%	8%	7%	100%
14	18	23	34	25	100
30	3	39	23	35	100
90	1	24	27	48	100

* Less than 500.

APPENDIX IV

USE OF TERMINATION RATES FOR ALL AGES OR ALL DURATIONS COMBINED

Termination rates often are not differentiated according to age and duration, particularly those derived from European experience. Perhaps this is because of a lack of sufficient data. The results must be used with caution, as they may be reflective of the portfolio distribution rather than the termination experience. It is obvious that the shorter durations normally will predominate. Accordingly, the averages may show very high termination rates that decrease as the portfolio matures, even though the actual termination rates do not change.

A hypothetical calculation for six-month deferment based on the disability model and level yearly production, and assuming entry age 30 for all insureds, shows combined termination rates for the entire portfolio of 34. 1, 22.0, and 12.1 percent in the first, tenth, and twenty-fifth years of production, respectively. This corresponds to aggregate termination rates, regardless of duration, of 34.1, 19.5, and 10.6 percent at attained ages 30, 40, and 65, respectively. Combining the figures for fixed durations of disability regardless of age, the rates become 18.7 percent for the second half-year of disablement, 11.5 percent for the tenth year, and 10.6 percent for the thirty-fourth year. It is interesting that these rates decrease throughout the entire period even though, for each single age except the very highest, terminations start to increase when the natural rise in the death rate becomes the predominant element.

DISCUSSION OF PRECEDING PAPER

E. PAUL BARNHART:

This paper is a very important and timely contribution, because it deals with experience beyond simply the claim rates and claim costs for the first year or two of the benefit period, such as have customarily been published in *TSA Reports* numbers. There are some data in the *Reports* on termination rates under group long-term disability experience, but the profession has an urgent need to develop more adequate information on this whole area of termination rates on a continuing-duration basis. We are very much indebted to Mr. Miller for this work.

I would comment specifically on just one item. The paper contains only a very brief description of the technique of "standardization" used, and I am not sure that this will be understood by most readers. It might be helpful if there were an appendix or some expansion, with more illustration, to explain clearly the technique of standardization in some detail.

OVE LUNDBERG:*

Table 1 of this discussion shows, for men and women separately, the deaths and recoveries per 1,000 of initial claims, according to the experience of the private Swedish Pension Plan (SPP). It corresponds to the presentation of the termination experience of the Finnish employment pension scheme for men and women combined in Table 9 of the paper. According to the Swedish policy conditions, a disability benefit is paid when total disability or partial disability of at least 50 percent has lasted for three calendar months. Because of these conditions the Swedish experience will be more comparable to the Finnish experience under individual policies (Table 10 of the paper).

The rates presented in Table 1 of this discussion show, for duration 0–1, slightly higher recovery rates for women in all but one age group. With few exceptions, the death rates are much less for women at all ages and durations. These exceptions probably are due to random variations. Thus, the almost universal pattern of the W/M ratios, noted by the authors, is confirmed by the Swedish experience. For comparison with the number of deaths per thousand disabled lives, the death rates per 1,000 insured persons in SPP, in 1965–69, are shown in the table at the top of page 487.[1]

* Dr. Lundberg, not a member of the Society, is a member of the Swedish Actuarial Association and is editor of the *Skandinavisk Aktuarietidskrift*.

[1] G. Larsson and Y. Pettersson, "Technical Bases of Staff Pension Insurance in Sweden," *Skandinavisk Aktuarietidskrift*, 1975, No. 3, pp. 157–80.

TABLE 1

TERMINATIONS OF DISABILITY PENSIONS BY SEX, DURATION, CAUSE OF TERMINATION AND AGE GROUP
SWEDISH STAFF PENSIONS (SPP), EXPERIENCE OF 1970–74, PER 1,000 OF INITIAL CLAIMS

DURATION OF DISABLEMENT IN YEARS	AGE GROUP AT DISABLEMENT															
	Under 30		30–34		35–39		40–44		45–49		50–54		55–59		60 and Over	
	D	R	D	R	D	R	D	R	D	R	D	R	D	R	D	R
	Men															
	(485)		(570)		(771)		(1,078)		(1,803)		(2,753)		(3,601)		(5,266)	
0–1	47	767	39	723	44	689	53	649	61	617	71	537	70	427	71	250
1–2	10	61	8	66	6	69	14	69	27	51	26	31	30	20	38	2
2–4	10	48	6	45	18	28	16	34	24	27	27	15	48	2	39	1
4–8	5	11	17	25	26	15	21	13	23	3	43	7	54	.....	30	.....
8–12	2	4	17	7	7	17	17	1	18	4	37	.....	37	.....	.....	.....
	Women															
	(777)		(536)		(503)		(666)		(862)		(985)		(879)		(319)	
0–1	13	843	13	748	26	734	38	638	44	621	49	546	51	474	34	310
1–2	6	52	8	79	6	65	23	59	25	44	30	41	26	32	19	19
2–4	2	24	6	37	12	31	26	29	23	12	18	31	17	3	0	.....
4–8	8	7	16	16	4	9	5	14	12	11	15	3	4	0	.....	.....
8–12	0	0	13	0	4	.....	7	0	3	3	9	0	.....	.....	.....	.....

NOTE.—D = death; R = recovery; numbers in parentheses are actual numbers of initial claims.

Ages	Death Rates		Ages	Death Rates	
	Men	Women		Men	Women
31–35	0.96	0.79	51–55	6.19	3.99
36–40	1.36	0.95	56–60	10.52	5.47
41–45	2.05	1.64	61–65	19.31	8.13
46–50	3.51	2.01			

(AUTHORS' REVIEW OF DISCUSSION)

JOHN H. MILLER AND SIMON COURANT:

Mr. Barnhart's comment relates to a very important aspect of the study of disability termination rates, namely, the analysis of interactive parameters that influence the level of termination rates to a significant degree. The approach of the Committee to Recommend New Disability Tables for Valuation to making estimates of the size and significance of the dependency among various parameters or classifications will be found in the remarks, on June 8, 1979, of Mr. William J. Taylor, chairman of the committee, appearing at page 634 of the *Record*, Volume V, Number 3. Since that date the committee has continued its studies on a broad front. The subject was treated in general by Mr. Edward J. Seligman, now a member of the committee, in his paper "Applications of Multidimensional Contingency Tables to the Analysis of Termination Counts in Disability Income Claim Data," presented at the September, 1979, ARCH Research Conference. The final report of the committee is expected to contain an account of its explorations and a rather detailed description of the methods and procedures adopted.

Dr. Lundberg's contribution of the Swedish experience and his analysis and comparison of that experience with some of the data presented in the paper were very welcome additions to the review of European experience. The W/M ratios developed reinforce the "law" mentioned on page 472 of the paper with respect to the relative level of termination rates of the sexes, leaving the United States social security experience the sole exception with respect to disability income benefits.

The authors are most appreciative of these discussions, which enhance the value of the paper both as an academic treatise and as a guide to the development of a sound technical basis for the valuation of disability claims.