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**GROUP WEEKLY INDEMNITY CONTINUATION TABLE STUDY**

**MORTON D. MILLER**

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**CHARLES E. PROBST:**

Mr. Miller has done a very commendable job in a field where up-to-date information is needed. The last complete study of this kind, in the 30's, was compiled by Mr. Fitzhugh, and published in *TASA XXXVIII*. Analysis of the tremendous volume of data in the present study was ably handled by Mr. Miller and the actuarial profession is grateful to him for his contribution.

As is recognized by Mr. Miller, 1947-49 were extremely favorable morbidity years. A study of Table IV shows that there were no severe epidemics or other serious fluctuations in morbidity during the period studied. I wish to repeat his warning that the net costs and other data should be considered as "basic" or minimum morbidity costs. Thus the use of the results alone as a basis for gross premiums might not be entirely satisfactory.

It is interesting to compare the costs developed by Miller's tables with those developed by Fitzhugh in his 1931-35 study. At first glance the costs in the new table appear to be lower. However, for those periods of disability covered by the usual plans, which were the periods where most information was available, the costs are surprisingly similar. The most understandable comparison for those familiar with Group rates is a gross monthly premium. In his paper, Mr. Fitzhugh derived a theoretical gross monthly premium from the pure claim costs by addition of a constant plus a percentage loading. I feel that the best comparison is to apply the identical loading formula to Miller's data and to compare the resulting theoretical "premiums" with those derived by Fitzhugh. These two sets of theoretical "premiums" are shown in Table 1.

It should be noted that for the popular 8-8-13 and 1-8-13 Plans the new "premium" exceeds the old one. Likewise it should be noted that on the most popular 26-week Plans the theoretical "premium" on the new basis does not support the reductions in 26-week Plan rates currently being offered. On all plans involving first-day Accident Coverage, the new premium calculation is lower. This is partly because of the assumption that accident costs comprise about  $\frac{1}{3}$  instead of  $\frac{1}{2}$  of total costs. However, it is very likely that plans paying from the first day for accidents are in

force, in large part, in industries where morbidity in general is good and where accidents are less frequent and severe. Thus the apparent low cost to go from a waiting period on accidents to first-day coverage may be incorrect if applied to all types of groups.

There is some question as to the derivation of the cost of sickness during the first three days. No plans studied provided such coverage, and it was necessary to approximate the cost of sickness during the first three days. Mr. Miller assumed that the costs during the unknown first three days follow a proportionate "backward trend," or extrapolation, from values developed over the first seven days on plans with

TABLE 1  
COMPARISON OF THEORETICAL GROSS  
MONTHLY "PREMIUMS"

DAY BENEFITS BEGIN		MAXIMUM BENEFIT DURATION					
		13 Weeks		26 Weeks		52 Weeks	
Acc.	Sick.	1947-49 Miller	1931-35 Fitzhugh	1947-49 Miller	1931-35 Fitzhugh	1947-49 Miller	1931-35 Fitzhugh
1	4	\$ .75	\$ .80	\$ .90	\$1 .01	\$1 .06	\$1 .14
1	8	.67	.66	.82	.86	.98	.98
1	15	.59	.59	.73	.78	.89	.90
4	4	.74	.77	.89	.97	1 .05	1 .11
8	8	.65	.60	.80	.80	.96	.93
15	15	.56	.52	.70	.71	.85	.83

waiting periods. It is questionable whether this assumption is reliable and whether the cost tables are indicative of sickness over the first three days. Moreover, I doubt that there is in existence a plan from which reliable information as to sickness during the first three days could be obtained. Certainly any data would be largely influenced by the individuals insured and by the system of reporting and recording one-day terms of sickness. Also, the type of sickness plan in effect will influence short-duration costs to a large degree. For these reasons I question that the material on sickness during the first three days is of much value.

Mr. Miller's derivation of the relation of female claim costs to male claim costs produces an over-all composite loading for all plans of about 215%. On one of the 13-week plans, the relation was as high as 221%. Hence it should be remembered that Mr. Miller's basic claim costs are subject to a slightly higher loading than the standard 2-times formula.

This paper will develop our knowledge of Accident and Health insurance, and the data, if used with the above points in mind, will be a tremendous help to actuaries working in the weekly indemnity field.

GILBERT W. FITZHUGH:

It is very helpful to have an up-to-date study of Group Accident and Health insurance claims by duration. As indicated by Mr. Miller, the last data of this nature were contained in my 1937 paper in the *Transactions*, based on the experience for the years 1931-35, and a lot has happened in the field of Group insurance since then.

This discussion is divided into two principal parts. In Part I, I would like to comment primarily on the general question of the differences in claim experience as indicated by different investigations or different parts of one investigation, and the extent to which such differences may be due to forces of selection of one kind or another. Selection is exercised not only by the insurance company but also by the employer and employees. There may also be an element of so-called "spurious" selection due to the inherent nature of the data or its method of compilation. Other differences may be due to actual variations in the claim experience from year to year.

In Part II, some observations will be made on the different methods of compilation and presentation used in constructing the tables of the 1931-35 study and the 1949 study, with particular reference to the treatment of the first three days of disability.

I. *Selection*

A combination of all three of the factors of selection and variation referred to above may very well explain the apparent increase in the claim costs (*i.e.*, number of weeks of paid-for disability per employee per year) under the 8th day 13-week plan between the 1931-35 study and the 1949 study, with an apparent decrease in the corresponding costs for the 4th day 13-week plan.

Mr. Miller refers to the fact that the claim experience underlying the basic morbidity table is the average of the seven contributing companies' separate experiences, and that there were indications of a considerable variation among the separate experiences of the contributing companies. Naturally, a similar situation existed in connection with the 1931-35 study. Accordingly, a different distribution of exposure by insurance company in the two experiences could account for a substantial apparent difference in results. For example, consider the difference in the experience between the 4th day and the 8th day plans of benefits. If one in-

insurance company features the 8th day plan and another features the 4th day plan, it is quite likely that they would have a different relative experience. It is likely that employers and unions selecting the 4th day plan exercise a certain amount of adverse selection, and this is naturally relatively more important in the smaller proportion of such plans that would be in force in the company featuring the 8th day plan. Accordingly, that company's relative experience under the 4th day plan would be likely to be higher than in the case of the other company which featured the 4th day plan.

Again with reference to the relative showing of the 4th and 8th day plans, it should be observed that the 1949 study is based on claim cost data (amount of disability per person per year) for three calendar years, with the continuance tables based on one year's claims. On the other hand, the 1931-35 study is based on a study over five calendar years. Just how important this can be may be seen by comparing Table II on page 358 of the 1931-35 study with Table VIII on page 51 of the 1949 study. As already indicated, Table VIII of the 1949 study shows a substantial increase in claim cost between the periods covered by the two studies for the 8th day 13-week plan with a decrease in the claim cost for the 4th day 13-week plan. However, Table II of the 1931-35 report shows that the variation in claim cost by calendar year on the 8th day 13-week plan within the five years encompassed by that study varied substantially, with the experience for one of the years being higher than that in the 1949 study. Similarly, for two of the years the cost on the 4th day 13-week plan was lower than the corresponding cost in the 1949 study. Considering the substantial fluctuation in experience by calendar year, the fact that the 1931-35 study included several years in the depth of the depression, taking cognizance of the rising trend of accident and health claim rates just at present, and recognizing the effect of different distributions of data by insurance companies, it is obvious that the difference between the results of the two studies may be due more to cyclical changes or to different distribution of the data or different methods of compiling them than to any basic change in the relative experience by plans.

In considering the difference between the experience under the various plans of benefit, other forms of selection are very important. Mr. Miller mentions some of these at the bottom of page 33 of his paper, but does not there refer to the very strong selection by the individual employees. However, in referring to the construction of his Continuation Table for the first three days' duration, commencing at the bottom of page 54, he refers to the fact that figures for one or two days' claims are affected by the fact that employees may not take the trouble to submit a claim for

one day's benefits. This is clear from a comparison of claims by duration under all the plans of benefits in both studies. Contrary to general data on incidence of sickness *absence* by duration, in the case of the incidence of sickness *claims* by duration the number of claims lasting for exactly one day of benefits, two days, three days, etc., goes up gradually as the number of days of benefit goes up, for the first few days for which benefits are paid, under both the 8th day and the 4th day plans of benefit.

Pursuing this approach further leads to a very interesting set of figures. Tables 1 and 2 show the very marked difference in incidence of claims by duration under the 8th day 13-week plan as compared with the 4th day 13-week plan. Both tables are based on a radix of 1,000 claims lasting for 8 or more days of disability, although the experience indicates that under the 4th day plan of benefit there will be relatively more claims lasting for at least 8 days of disability than under the 8th day plan. Even ignoring this important factor, a comparison of the figures in columns 8, 9, and 10 of the two tables is very interesting. Using column 8 as an illustration, under the 8th day plan of benefit, of 1,000 claims for disabilities lasting 8 days or longer, there were only 13 claims terminating after exactly 8 days of disability—with thus only one day's benefit—and 26 terminating after 9 days, with two days' benefits. On the other hand, under the 4th day plan of benefit, out of 1,000 claims for disabilities lasting 8 days or longer, there were 65 claims terminating after exactly 8 days of disability (which would thus have 5 days of benefits) and 132 claims terminating after the 9th day. (The trend of the figures indicates that the 132 is accidentally high—perhaps 80 would be closer, but this is still more than 3 times the number for the corresponding duration of disability under the 8th day plan.)

There appears to be a closer resemblance between the trend or curve by duration of period of *benefit* rather than by duration of period of *disability*, for the first few days of benefit. This can be seen clearly from Table 3. It will be noted that in both the 1949 and 1931–35 studies the figures in the center column, showing the claims under the 8th day plan by duration of *benefit*, are closer in the early durations to those in the left-hand column, showing claims under the 4th day plan by corresponding duration of benefit, but closer in the later durations to those in the right-hand column, which show claims under the 4th day plan by duration of *disability* corresponding to the duration of *disability* for the 8th day plan. In absolute amount, as compared with trends, the effect of selection by plan of benefit evidently lasts for quite some duration, as can be seen by comparing Table 1 and Table 2, making appropriate increases in the number of claims terminating each day under the 4th day plans to allow for the

TABLE 1  
8TH DAY 13-WEEK PLANS—MALES  
FREQUENCY DISTRIBUTION OF ACCIDENT AND SICKNESS CLAIMS

DURATION i	NUMBER OF CLAIMS ENTERING THE iTH DAY OR WEEK OF DISABILITY						NUMBER OF CLAIMS TER- MINATING IN EXACTLY i DAYS OR IN EXACTLY THE iTH WEEK			
	1949 Study 8th Day Accident Plan			1949 Study 1st Day Accident Plan			1931- 1935 Study 8-8-13 Plan Total	1949 Study Total Accident and Sickness		1931- 1935 Study 8-8-13 Plan Total
	Acci- dent	Sick- ness	Total	Acci- dent	Sick- ness	Total		8th Day Accident Plan	1st Day Accident Plan	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
8th Day...	100	900	1000	129	871	1000	1000	13	16	7
9th " .....	99	888	987	122	862	984	993	26	28	13
10th " .....	97	864	961	115	841	956	980	27	29	21
11th " .....	94	840	934	109	818	927	959	34	29	26
12th " .....	91	809	900	105	793	898	933	33	33	30
13th " .....	88	779	867	101	764	865	903	35	33	35
14th " .....	86	746	832	97	735	832	868	45	44	37
15th " .....	81	706	787	91	697	788	831	27	29	37
16th " .....	78	682	760	86	673	759	794	42	42	34
17th " .....	73	645	718	81	636	717	760	31	31	29
18th " .....	71	616	687	77	609	686	731	24	25	26
19th " .....	69	594	663	75	586	661	705	19	23	24
20th " .....	68	576	644	72	566	638	681	20	20	23
21st " .....	67	557	624	70	548	618	658	29	26	23
22d " .....	63	532	595	67	525	592	635	19	17	23
23d " .....	60	516	576	64	511	575	612	23	23	19
24th " .....	57	496	553	61	491	552	593	19	19	18
25th " .....	55	479	534	59	474	533	575	16	16	17
26th " .....	54	464	518	57	460	517	558	16	12	16
27th " .....	52	450	502	56	449	505	542	14	13	15
28th " .....	52	436	488	55	437	492	527	20	19	15
5th week...	49	419	468	53	420	473	512	86	89	95
6th " .....	40	342	382	43	341	384	417	67	62	66
7th " .....	32	283	315	35	287	322	351	51	50	50
8th " .....	27	237	264	29	243	272	301	37	39	40
9th " .....	23	204	227	25	208	233	261	30	30	33
10th " .....	19	178	197	22	181	203	228	23	25	27
11th " .....	17	157	174	19	159	178	201	18	20	22
12th " .....	14	142	156	16	142	158	179	16	17	20
13th " .....	13	127	140	15	126	141	159	6	5	15
14th " *	12	122	134	14	122	136	144	134	136	144

\* Including claims running the full 13 weeks of benefits.

TABLE 2  
4TH DAY 13-WEEK PLANS—MALES  
FREQUENCY DISTRIBUTION OF ACCIDENT AND SICKNESS CLAIMS

DURATION i	NUMBER OF CLAIMS ENTERING THE iTH DAY OR WEEK OF DISABILITY						NUMBER OF CLAIMS TER- MINATING IN EXACTLY j DAYS OR IN EXACTLY THE iTH WEEK			
	1949 Study 4th Day Acci- dent Plan			1949 Study 1st Day Acci- dent Plan			1931- 1935 Study 4-4-13 Plan Total	1949 Study Total Accident and Sickness		1931- 1935 Study 4-4-13 Plan Total
	Acci- dent	Sick- ness	Total	Acci- dent	Sick- ness	Total		4th Day Accident Plan	1st Day Accident Plan	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
4th day...	107	1099	1206	138	1072	1210	1150	16	23	12
5th "...	106	1084	1190	133	1054	1187	1138	38	49	30
6th "...	103	1049	1152	127	1011	1138	1108	57	69	47
7th "...	99	996	1095	119	950	1069	1061	95	69	61
8th "...	93	907	1000	106	894	1000	1000	65	59	69
9th "...	85	850	935	97	844	941	931	132	87	71
10th "...	78	725	803	88	766	854	860	77	65	68
11th "...	74	652	726	82	707	789	792	53	50	59
12th "...	70	603	673	78	661	739	733	43	43	51
13th "...	67	563	630	74	622	696	682	36	38	43
14th "...	64	530	594	71	587	658	639	32	38	38
15th "...	60	502	562	66	554	620	601	26	28	35
16th "...	55	481	536	62	530	592	566	38	42	31
17th "...	51	447	498	58	492	550	535	30	32	28
18th "...	49	419	468	55	463	518	507	21	24	26
19th "...	47	400	447	53	441	494	481	15	20	23
20th "...	46	386	432	51	423	474	458	19	20	21
21st "...	44	369	413	48	406	454	437	14	19	19
22d "...	42	357	399	45	390	435	418	13	15	17
23d "...	40	346	386	43	377	420	401	18	20	16
24th "...	38	330	368	41	359	400	385	13	17	14
25th "...	37	318	355	40	343	383	371	13	14	12
26th "...	36	306	342	39	330	369	359	12	14	11
27th "...	35	295	330	38	317	355	348	10	11	11
28th "...	34	286	320	37	307	344	337	10	10	10
5th week...	32	278	310	36	298	334	327	59	68	70
6th "...	26	225	251	28	238	266	257	43	43	49
7th "...	21	187	208	24	199	223	208	40	37	34
8th "...	18	150	168	20	166	186	174	27	26	25
9th "...	15	126	141	17	143	160	149	21	22	19
10th "...	13	107	120	15	123	138	130	15	17	15
11th "...	11	94	105	13	108	121	115	16	14	13
12th "...	9	80	89	11	96	107	102	10	11	11
13th "...	9	72	79	9	87	96	91	3	4	11
14th "*...	8	68	76	9	83	92	80	76	92	80

\* Including claims running the full 13 weeks of benefits, i. e., 13 weeks and 3 days of disability.

higher claim incidence (the use of a radix of 1,000 claims lasting 8 days or longer for both 4th and 8th day plans understating the number of claims under the 4th day plan).

It is interesting to note the material difference in the incidence of claims by duration and by plan of benefit between the 1931-35 study and the 1949 study. The relative difference between the 4th day plans and the 8th day plans, and the tendency for the claims by duration to increase during the first few days of claim payments, is less pronounced in the later

TABLE 3  
CLAIMS BY DURATION OF CLAIM AS COMPARED WITH  
DURATION OF DISABILITY

	1949 STUDY			1931-1935 STUDY		
	Number of Claims for Which Exactly $t$ Days of Benefits Were Paid ( <i>i.e.</i> , Claims Lasting Exactly $t+3$ Days)	Number of Claims for Which Exactly $t$ Days of Benefits Were Paid ( <i>i.e.</i> , Claims Lasting Exactly $t+7$ Days)	Number of Claims for Which Exactly $t+4$ Days of Benefits Were Paid ( <i>i.e.</i> , Claims Lasting Exactly $t+7$ Days)	Number of Claims for Which Exactly $t$ Days of Benefits Were Paid ( <i>i.e.</i> , Claims Lasting Exactly $t+3$ Days)	Number of Claims for Which Exactly $t$ Days of Benefits Were Paid ( <i>i.e.</i> , Claims Lasting Exactly $t+7$ Days)	Number of Claims for Which Exactly $t+4$ Days of Benefits Were Paid ( <i>i.e.</i> , Claims Lasting Exactly $t+7$ Days)
	4-4-13 Plan	8-8-13 Plan	4-4-13 Plan	4-4-13 Plan	8-8-13 Plan	4-4-13 Plan
1....	16	13	65	12	7	69
2....	38	26	132	30	13	71
3....	57	27	77	47	21	68
4....	95	34	53	61	26	59
5....	65	33	43	69	30	51
6....	132	35	36	71	35	43
7....	77	45	32	68	37	38
8....	53	27	26	59	37	35
9....	43	42	38	51	34	31
10....	36	31	30	43	29	28

study than in the earlier study. In the absence of other factors, it might have been thought that the reverse would have been the case, because the 1931-35 study covered a period of depression. It might thus have been anticipated that a claim for one day's benefits would have been relatively more important than in 1949 (even with the lower average amount of weekly benefit generally prevailing at the time of the earlier study), so that there would not have been relatively as many people who did not submit a claim for one day's benefits even though they were disabled. It would appear that for one reason or another insured employees are be-

coming more claim-conscious and submitting claims for shorter durations of benefits in a higher percentage of cases of disability. This might explain the increase in the claim frequencies in recent years, which has been accompanied by a decrease in average duration.

It will be interesting when data are available to see if the current increase in claim costs in 1951 is due to more claims of shorter durations or to an increase all along the line.

As further evidence of selection likely to be due to the existence of a benefit plan, it is interesting to compare the figures shown for the first day accident plans with those for the plans where the accident benefits begin on the same day as the sickness benefits. For example, out of 1,000 claims lasting at least 8 days, under the 1st day accident 8th day sickness 13-week plan 129 are accident claims, while under the corresponding plan where accident benefits begin on the 8th day only 100 are accident claims. While it is unlikely that the existence of first day accident benefits would increase the number of accidents, it apparently does affect the number of such accidents which result in disabilities lasting 8 days or longer, or at least the number of claims submitted for such disabilities.

These data illustrate very well the importance of knowing the nature of the basic data in making any interpretations or drawing any conclusions from any figures purporting to show rates of "sickness." It is clear that there can be a substantial difference between rates of sickness and rates of sickness claims under insurance plans. This difference can be broken down into several component parts:

1. The difference between actual sickness and absence due to actual sickness—entirely aside from any question of whether or not earnings are continued or there is or is not insurance protection. This involves the degree of sickness. We all know that with the same type of cold, for example, some people will stay home and others will come to work. Also, there is a considerable difference between how long different people would stay out for the same degree of sickness.

2. The difference between absence due to sickness where earnings are continued or where there is insurance, and absence due to sickness where there are no such benefits.

3. In cases where there is insurance protection, the difference between absence due to sickness and claims for sickness—particularly for short periods of benefit.

Considering the above factors in the light of the experience derived from these two studies, it is clear that the subjective elements in the field of sickness are extremely important. Any estimates of possible claim costs under any proposed plan of sickness insurance—governmental or private—must keep these elements prominently in mind, especially if

claim costs must be projected from data obtained on groups having no insurance protection. It is also clear that the methods and detailed operation of administration can have an important effect on sickness claim rates.

## II. *Construction of Tables*

It should be noted particularly that Tables 1 and 2 are based on the basic data of both studies rather than the graduated tables. This is because for the purpose indicated the graduated tables are not necessarily significant. The method of handling the claims at the beginning and end of the 8th day 13-week period of duration to produce data that could be used for all plans of benefit differed materially between the two studies, as set forth in each respective study. This would have clouded the inherent nature of the data if the graduated tables were used for the purposes of Part I of this discussion. Part II deals with some of the differences between the methods of constructing the graduated tables used in the two studies.

The 1949 study was primarily a study of duration, with frequency being brought in only by indirection. Mr. Miller accordingly graduated his continuation tables, and showed separate tables for 4th day plans as compared with 8th day plans. However, claim frequency is at least of equal importance in determining the amount of disability per person per year—or “claim costs.” The 1931–35 study graduated the claim cost data directly rather than the claim continuation data. Each resulting graduation is useful for the purpose for which it was intended, but each must be used carefully as there are many pitfalls if the method of construction is not carefully kept in mind.

For example, in both the 1949 and the 1931–35 studies the extra claim cost from the second week of disability to the fourteenth under the 8th day 26-week plan as compared with the 8th day 13-week plan was put over into the second 13 weeks' experience in order to have the basic graduated claim cost table produce the actual claim costs for the 8th day 13-week experience. However, different procedures were followed in the two studies for the first week of disability. In the 1931–35 study, the same principle was followed of putting the excess claims from the second to the fourteenth week under the 4th day 13-week plan into the period from the 4th to the 7th day of disability. Because of the relatively greater difference in the claims costs for two plans of benefit under that study, this resulted in a very high claim cost from the 4th to the 7th day. The experience for the first three days was then projected back on the assumption, based on what limited noninsurance data were available on the incidence of short-

term sickness, that there would be at least as many cases of disability lasting 1, 2, or 3 days, as lasted 4 days.

On the other hand, Mr. Miller states that, based on the data in his study, the extra number of claims under the 4th day plans in the early weeks of disability is offset by a more rapid falling off in the claims under this plan of benefit, which was not the case in the 1931-35 study as can be seen from the graphs in that study. Accordingly, while he uses different continuation tables for the 4th and 8th day plans of benefits, he arrives at the same claim cost from the 8th day to the 14th week under both plans, and thus uses the same graduated table for basic claim costs for both plans. He thus had to make no adjustment in claim costs in the early insured durations comparable to that in the 1931-35 study. In getting duration figures for the first three days of disability he extrapolated back from the figures from the 4th day on, presumably having in mind the actual experience for accidents for the first three days. This of course produced very materially different results than the method used in the 1931-35 study.

Accordingly, a substantial part of the differences between the two studies, particularly in the early durations, as indicated on page 57 of the 1949 study, is due more to peculiarities of the basic data and the method of dealing with those data than to inherent differences in the experience. For most purposes, the differences between the two studies are not too material for most durations of disability which have in practice been covered by group sickness and accident insurance. This is very important, as it strengthens the degree of confidence in the use of either or both tables for these practical purposes. However, in the case of the early durations, particularly the figures shown for the first three days of disability, where no actual experience on sickness claims was available for either study, neither of the two studies should be used as any guide to what the claim cost would be for an insurance plan providing benefits from the first day of sickness. General data indicate that the incidence of sickness lasting exactly 1, 2, or 3 days is considerably different from the incidence of accidents, and of course the subjective elements are very much more important. For example, Mr. Miller's figures show that the average duration of accident claims commencing on the first day of disability is greater than the average duration of those commencing on the fourth day, or in some cases even after the seventh day. This would clearly not hold for sickness claims. Furthermore, even if general data were used for the first three days of sickness disability to supplement the actual claim data from the 4th day on, what the rates of sickness for the first three days of disability would be if insurance were provided might be quite different from the

rates of sickness during the first three days derived from general data where there was no such insurance. While both studies indicate that claims are not always submitted for one or two days of benefit, the trend seems to be towards submitting claims in a greater number of cases.

Accordingly, it cannot be emphasized too strongly that neither of the studies should be used as a basis of determining costs for plans of benefits with waiting periods of less than three days for sickness. This question of estimated claim cost is, of course, entirely separate from other important considerations that would be involved in such plans, such as what the administrative costs would be for a plan providing benefits for the first three days of sickness.

Once again I would like to express my appreciation of having this up-to-date study made available, and congratulate the author on having produced some very useful figures from the basic data.

ARTHUR G. WEAVER:

Mr. Miller has produced continuation and basic morbidity tables derived from a broad base of recent statistical data. The need for such tables has been evident for some time in view of postwar trends in medical science, employment practices and certain other factors. From a technical point of view, the author is to be congratulated for the highly competent methodology adopted in melding data for a variety of plans into a single basic morbidity table.

The new tables are based on claim experience contributed by seven companies underwriting 67% of the group weekly indemnity insurance in the United States. Mr. Miller has mentioned that there are indications of a considerable variation among the separate experiences of these companies. As a measure of the fluctuation, I have compared the contribution of one company (John Hancock) with the average of the seven participating companies. First, the data contributed by this company to the continuation table study showed a close correspondence with the seven company average. However, our Table 1 shows considerable fluctuation in the annual claim cost per \$1 of male exposure (as defined in the 1949 Report of the Committee on Group Mortality and Morbidity). This is readily understood in view of the varying underwriting and claims practices of the companies. Since the proportion of male exposure contributed varies widely by company and also within company by plan, I have shown how a John Hancock contribution of 0% and 100% of the total male exposure in 1948 and 1949 would have affected the intercompany averages.

From this table we conclude that the claim experience of an individual company with a substantial volume of exposure may deviate from the

published intercompany claim costs and from Mr. Miller's basic morbidity table by 10% or more on any one plan. Additional fluctuation may be expected as a result of differences in geographical distribution of business, sex composition of individual groups, economic cycle, etc.

It is instructive to compare the annual claim frequency and duration for males developed from the 1931-35 and 1947-49 intercompany data, as

TABLE 1  
GROUP ACCIDENT AND SICKNESS INSURANCE  
NONRATED INDUSTRIES, ALL EXPOSURE SIZE GROUPS

PLAN	YEAR	ANNUAL CLAIM COST PER \$1 OF MALE EXPOSURE			ANNUAL CLAIM COST AS PER- CENTAGE OF INTERCOMPANY 1947-49 CLAIM COST		
		Inter- company	Assuming John Hancock Con- tributes		Inter- company	Assuming John Hancock Con- tributes	
			0%	100%		0%	100%
1-4-13.....	1948	\$ .560	\$.560	\$.559	94.0%	94.0%	93.8%
	1949	.594	.598	.534	99.7	100.3	89.6
4-4-13.....	1948	.550	.550	.668	98.9	98.9	120.1
	1949	.552	.551	.677	99.3	99.1	121.8
1-8-13.....	1948	.480	.479	.487	96.0	95.8	97.4
	1949	.513	.517	.452	102.6	103.4	90.4
8-8-13.....	1948	.500	.500	.521	98.4	98.4	102.6
	1949	.497	.497	.513	97.8	97.8	101.0
1-8-26.....	1948	.640	.644	.449	97.4	98.0	67.1
	1949	.646	.649	.520	98.3	98.8	79.1
8-8-26.....	1948	.610	.610	.608	95.9	95.9	95.6
	1949	.514	.513	.683	80.8	80.7	107.4

shown in Table 2. Note that Mr. Fitzhugh's paper (*TASA XXXVIII*, 354) referred only to "4-day" and "8-day" plans and was silent on his treatment of plans where waiting periods for accident and sickness were different.

For every plan the claim frequency has increased; the increase is substantial on the 8-day plans. At the same time the average duration per disability has dropped in the latest study, indicating that the increased frequency may have resulted from an increased number of short duration claims. This is confirmed by comparing the recoveries at each duration for

both sets of intercompany data. For 8-day plans, the 1947-49 recoveries are five times the 1931-35 recoveries for the 8th day and do not fall below 1931-35 recoveries until the 13th day. Thereafter the pattern of recoveries is essentially the same. The higher frequency of short-term claims may have a number of explanations including changed underwriting standards, changed age distribution of the work force, changed policy provisions and tighter labor market conditions.

An examination of Mr. Miller's annual tabular cost shows a definite change in incidence. Each day during the first week of disability the tabular cost is substantially lower than in Mr. Fitzhugh's study. The ratio of Miller/Fitzhugh tabular cost is .249 for the 1st day and increases steadily to a maximum of 1.730 for the 5th week, thereafter decreasing to

TABLE 2  
ANNUAL CLAIM FREQUENCY AND DURATION—MALES

1931-1935 INTERCOMPANY			1947-1949 INTERCOMPANY		
Plan	Annual Claim Frequency	Duration Weeks	Plan	Annual Claim Frequency	Duration Weeks
4-4-13.....	.1811	3.30	1-4-13.....	.1780	3.27
			4-4-13.....	.1825	3.03
8-8-13.....	.0885	4.82	1-8-13.....	.1103	4.47
			8-8-13.....	.1074	4.46
8-8-26.....	.1028	6.12	1-8-26.....	.1318	5.10
			8-8-26.....	.1146	5.40

.715 for the 23d week. For later durations the ratio again increases rapidly until it exceeds 2.000 in the 42d week and reaches a peak of 2.700 in the 45th week. The changed patterns of morbidity cost emphasize the influence of spectacular improvements in medical science which have reduced certain diseases to the vanishing point and have improved mortality in others. The latter factor combined with the aging work force may operate to increase morbidity costs.

The low tabular cost for the first three days calls for comment. As I understand their determination, Mr. Miller has in effect assumed that sickness claims in this period follow the same pattern as accident claims reported under 1-4 and 1-8 plans. This is entirely different from Mr. Fitzhugh's assumption that approximately the same number of people would be disabled exactly one day, exactly two days, exactly three days, and exactly four days. Public Health Service statistics at the time of Mr. Fitzhugh's study tended to support his position. A more recent study of the 1933-39

experience of male employees of a public utility indicates that both assumptions understate short-term disabilities for this group.

Both Mr. Miller and Mr. Fitzhugh have encountered what seems to be a basic difference in continuation table data for 4-day and 8-day plans. When graphs are prepared of 1931-35 and 1947-49 data for both plans, one is impressed with the similarity in the incidence of disability for all four graphs, particularly after the fourth week. Although no serious effort has been made to fit a curve to the data, it appears that they can be represented reasonably well by a modified exponential formula.

Table 3 shows the 1931-35 and 1947-49 crude data recast in such a way that 100,000 lives are disabled at the beginning of the 5th week for 4-day and 8-day plans in each period. Under 8-day plans, since only those disabled at the beginning of the second week become claimants, the number

TABLE 3

DURATION <i>t</i>	1931-35 CONTINUATION TABLE—MALES			1947-49 CONTINUATION TABLE—MALES		
	No. Claimants Disabled at Beginning of Duration <i>t</i>					
	4-Day Plans	8-Day Plans	Excess	4-Day Plans	8-Day Plans	Excess
4 days.....	351,655	195,970	155,685	370,895	211,117	159,778
2 weeks.....	305,830	195,970	109,860	303,961	211,117	92,844
3 weeks.....	183,690	162,856	20,834	186,439	162,485	23,954
4 weeks.....	127,962	124,312	3,650	131,152	124,921	6,231
5 weeks.....	100,000	100,000	0	100,000	100,000	0

of claimants for the first two durations shown must be the same. The columns marked "Excess" represent those claims under 4-day plans which apparently have no counterpart in the 8-day plan statistics.

It is significant that the excess claims represent approximately 50% of the 8-day plan claims, the number being much the same for the two periods studied. These excess claims are of short duration, the bulk terminating in the second week of disability with an average of slightly less than ten days. There is undoubtedly some inertia to filing claims for a few days' benefits (although indications are that this is less of a factor in the 1947-49 study) and certain employees insured under 8-day plans may forego such benefits, particularly when the expense and inconvenience of a doctor's certificate are involved. Furthermore, certain psychological factors may enter into the determination of the date of recovery from a disability, e.g., the wish to extend the convalescent period to include an approaching weekend and the practice of busy doctors to suggest a minimum

period of "a week or ten days" before the patient returns for check-up. Mr. Miller's explanation of "the somewhat indefinite selection process" has merit, and it will be interesting to study the claim experience under union-management welfare plans where the present tendency is to reduce the waiting period.

W. RULON WILLIAMSON:

There have been two tabulations of "Disability Continuation," not commonly available to the "man in the street":

1. Within the Social Security Administration Mr. Shudde, and perhaps Mrs. Van Eenam, spent a good deal of time in developing such tables, graphically displayed, and in reviewing the work done in other parts of the Board, the Administration and the Agency. Here the effort was to enlarge the scope of the analysis, to outline—to the extent possible—the apparent persistence of disability from incidence up to the end of forty or fifty years duration.
2. Within the Blue Cross Commission, over many years, for the operational requirements of the varied organizations dealing with the hospitalization benefits, tables and graphs showed, up to the end of the compensated days of hospitalization, the similar  $L_x$  data for duration of hospitalization.

In each instance the limitations of the particular "universe" had to be borne in mind. So, one of the interesting items in Mr. Miller's paper is the Table VI evidence that 2% of the entrants are still disabled at the end of a year, when using the 4-day data, but 3% still last out when using the 8-day data.

Vital factors in relation to claims costs include the belief of those protected in the outside subsidy footing the bills, the ratio of benefits to earnings, the intentional liberalization of the benefit and the expected purpose of the liberalization, and what boundaries have been drawn between the trivial, the serious and the catastrophic.

Mr. Miller's paper is a good one, in that it raises a lot of questions. Those I note here involve the carrier, the ultimate purpose of the protection itself, and the extent of the reliance on subsidy and ideology. One thing that a study by the old Bureau of Research and Statistics within the Social Security Board brought out in one of their publications was the sensitivity of disability experience to Government domination through the ready apparent availability of taxes for benefits. In using any fringe benefits today, the employer is competing with the optimism of Government Agencies as to the extent of subsidy above the employee contribution. Government tends to magnify needs in arguing for benefits, and to minimize the financial requirements to fall upon the taxpayer. With its additional dominance in collective bargaining, the belief in the "free ride" is pretty strong.

STANLEY W. GINGERY:

Mr. Miller has presented a very valuable and timely analysis of the statistics underlying the operation of Group Weekly Indemnity plans. There are a few aspects of this important subject that I would like to comment on.

In developing a basic morbidity table for the paper presented in *TASA XXXVIII*, 354, Mr. Fitzhugh was faced with certain difficulties which appeared to arise out of selection against the insurance company. One result of that adverse selection was to produce higher morbidity costs for the early periods of disability under the 4-day waiting period plan than

TABLE 1  
GROUP WEEKLY INDEMNITY ANNUAL MALE CLAIM COSTS

PERIOD OF DISABILITY IN DAYS	FITZHUGH (1931-35)				MILLER (1947-49)			
	Crude			Basic	Crude			Basic
	4-13 Plans	8-13 Plans	8-26 Plans	All Plans	4-13 Plans	8-13 Plans	8-26 Plans	All Plans
1- 3.....				.2860				.0820
4- 7.....	.1003			.1817	.097			.0970
8- 21.....	.2074	.1490	.1733	.1635	.193	.173	.183	.1825
22- 35.....	.1050	.0923	.1052	.0624	.099	.104	.107	.1004
36- 91.....	.1793	.1734	.2029	.1811	.173	.188	.202	.1821
92-182.....			.1408	.2103			.130	.1571
4- 91.....	.5920			.5887	.562			.5620
8- 91.....	.4917	.4147	.4814	.4070	.465	.465	.492	.4650
22- 91.....	.2843	.2657	.3081	.2435	.272	.292	.309	.2825
8-182.....			.6222	.6173			.622	.6221

under the two 8-day waiting period plans, which were not offset in the later periods of disability by lower morbidity costs. He commented on this (on page 360), and made provision for it in determining the morbidity costs for the early days of disability (on page 369).

Mr. Miller's investigation produces somewhat different results. On pages 52 and 53 of his paper, Mr. Miller points out that, although the morbidity cost of 4-day 13-week plans is greater in the early part of the 8-91 day period of disability than it is for the same period under the 8-day 13-week plans, the reverse is true in the latter part of that benefit period to a sufficient extent that the costs for the entire 8-91 day period of dis-

ability are identical under the two plans. The figures involved in this point are summarized in Table 1.

This table indicates that nearly all of the excess morbidity cost for the first seven days of disability, exhibited by Fitzhugh's basic morbidity table as compared with Mr. Miller's table, is due to the method used in preparing the table from the crude data, and was intended to compensate for the extra morbidity of the 4-day plans over the 8-day plans, during the 8-21 day period of disability. In other words, there is very little difference between Mr. Fitzhugh's and Mr. Miller's crude claim costs for the 4-7 day period of disability.

The conclusion might be drawn from the foregoing comparison that the current opinion is that the cost of providing benefits from the 4th day or even from earlier periods of disability are now quite nominal, as compared with their cost 15 years ago. Mr. Miller cautions the reader against the latter conclusion on page 54 of his paper. I should also like to point out the need for cautious judgment with regard to no-waiting-period plans, if any should be given consideration, as well as to state that there is a similar need for the exercise of caution with respect to the cost of 3-day sickness waiting period plans as compared with 7-day sickness waiting period plans. Consideration of this point brings to mind two comments.

One comment is that the need for careful selection by the insurance company, as shown by Fitzhugh's data, may have influenced the experience analyzed by Mr. Miller. In the field of Group life insurance, it is commonly thought that the cost of the old total and permanent installment type disability clause is less under groups to which it currently applies than it would be for the general run of groups. This is because careful underwriting selection has been exercised by the insurance companies since the early 1930's, at which time the sale of Group insurance containing this clause was generally discontinued. Similar underwriting selection may have been exercised during part or all of the intervening period as a result of Fitzhugh's study or other factors, which would mean that this relatively favorable experience might disappear if underwriting standards were relaxed to an appreciable extent.

The other comment on this point is that some other technique of analyzing the data might produce somewhat different results. In this connection, Mr. Miller points out on page 58 that his analysis involves the use of individual judgment in the development of the necessary actuarial technique and in the interpretation of the data. With this thought in mind, I developed an alternative analysis on the basis of the subdivision of the continuation data, which was supplied for my use by Mr. Miller. Although I didn't deem it necessary to take the time to produce a com-

pletely new graduated basic table, I have developed morbidity costs for various periods of disability which serve to indicate what the general characteristics of such a table would be. The result of this second comment is described in the following paragraphs and is summarized in Tables 2 to 5.

In developing an independent analysis, my thought was that the variations in annual claim costs for various classifications of experience might be partly due to variations in the duration of claims and not entirely to variations in their frequency. I, therefore, chose to use only the continuation data of the nonrated, nonjumbo classification of experience. After modification by exclusion from the data of one company's contribution for the 4-4-13 week plan (because its average duration of 2.05 weeks as com-

TABLE 2  
AVERAGE DURATION OF DISABILITY  
IN WEEKS FOR MALES

Plan	Miller's Data	Nonrated, Nonjumbo Data
1-4-13.....	3.27	3.28
4-4-13.....	3.03	3.34*
1-8-13.....	4.47	4.40
8-8-13.....	4.46	4.68
1-8-26.....	5.10	5.44
8-8-26.....	5.40	5.48

\* After exclusion of nonhomogeneous data.

pared with 3.34 weeks of the remaining companies appeared to make it nonrepresentative), results were obtained which are summarized in Table 2.

It will be noted from Table 2 that the adjusted nonrated, nonjumbo data exhibit a longer duration for the 4-4-13 plan than for the 1-4-13 plan, as compared with the reverse indication of Mr. Miller's data.

New annual male claim costs were derived to be used in conjunction with the nonrated, nonjumbo (*i.e.*, cases having not more than 5,000 lives) continuation data. These were derived from the exposure size groups 0-7 inclusive (*i.e.*, of cases having less than \$40,000 of weekly indemnity), since some jumbo experience is included in exposure size 8. These were obtained by the solution of two simultaneous equations which, in effect, equated the male and female net claim costs of the 0-11% female grouping to the respective average claim costs of the remainder of the percent female groupings in total. The resultant claim costs were then adjusted

by a factor to obtain final claim costs. That factor was derived in such a way that the resulting final claim costs would reproduce the crude claim costs of the entire nonrated experience of all exposure size groups, while retaining the relationship of female to male average claim costs exhibited by the experience of the exposure size groups 0-7, inclusive. These results are shown in Table 3 and are compared with Mr. Miller's and Mr. Fitzhugh's data.

Before proceeding with the development of subdivided male costs, it is interesting to note that the nonrated, nonjumbo experience exhibits a

TABLE 3  
ANNUAL CLAIM COSTS

PLAN	FITZHUGH			MILLER			NONRATED, NONJUMBO		
	Male	Female	Ratio F/M	Male	Female	Ratio F/M	Male	Female	Ratio F/M
1-8-26				.672	1.299	193%	.648	1.029	159%
8-8-26	.6292	.9107	145%	.619	1.171	189%	.624	1.107	177%
1-4-13				.582	1.250	215%	.606	1.221	201%
4-4-13	.5973	1.0778	180%	.553	1.223	221%	.586	1.219	208%
1-8-13				.493	1.077	218%	.491	1.121	228%
8-8-13	.4268	.9235	216%	.479	1.049	219%	.463	1.080	233%
Total			201%			215%			220%

regularly increasing ratio of female to male claim costs, as the costs decrease. This is consistent with the fact that the maternity benefits provided are subject to a maximum of six weeks for all of the plans. Other factors may have influenced the progression of these ratios and they are not necessarily significant. However, it is also to be noted that, in general, a similar pattern of ratios was exhibited by Mr. Fitzhugh's data, which yielded male and female claim costs directly rather than through an analysis of composite data. Furthermore, it will be noted that the relative difference in male claim costs between plans is quite consistent.

The nonrated, nonjumbo continuation data were used to subdivide the annual male claim costs, as summarized in Table 4.

The male claim frequencies produced from this analysis of nonrated, nonjumbo data are also compared with Mr. Miller's data in Table 5.

The relationship of "total" claim frequencies, exhibited by the nonrated, nonjumbo analysis, is consistent with that theoretically expected between each of the first day accident plans and the corresponding plan

with the same sickness waiting period although the absolute degree of that relationship is not necessarily ideal.

From Table 4, which shows the subdivision of crude claim costs for various periods of disability, it can be seen that the 4-day sickness waiting period plans exhibit some additional morbidity in the 8-21 day period of disability, as compared with that of the 8-day plans, which is not offset in the 22-91 day period of disability. This analysis, therefore, indicates continued need for caution regarding the effect of the waiting period on the resultant claim costs, although I am mindful that other techniques might possibly have produced differing results.

TABLE 4  
ANNUAL CLAIM COSTS—(DERIVED FROM  
NONRATED, NONJUMBO DATA)

PERIOD OF DISABILITY IN DAYS	CRUDE			INDICATED BASIC
	4-13 Plans	8-13 Plans	8-26 Plans	All Plans
1- 3.....				
4- 7.....	.098			.131
8- 21.....	.203	.169	.183	.169
22- 35.....	.105	.102	.107	.105
36- 91.....	.183	.187	.200	.184
92-182.....			.129	.164
4- 91.....	.589			.589
8- 91.....	.491	.458	.490	.458
22- 91.....	.288	.289	.307	.289
8-182.....			.619	.622

TABLE 5  
ANNUAL CLAIM FREQUENCY—MALES

PLAN	MILLER'S ANALYSIS			NONRATED, NONJUMBO ANALYSIS		
	Total	Accident	Sickness	Total	Accident	Sickness
1-4-13.....	.1780	.0216	.1564	.1848	.0222	.1626
4-4-13.....	.1825	.0162	.1663	.1754	.0182	.1572
1-8-13.....	.1103	.0175	.0928	.1116	.0176	.0940
8-8-13.....	.1074	.0108	.0966	.0989	.0109	.0880
1-8-26.....	.1318	.0237	.1081	.1191	.0188	.1003
8-8-26.....	.1146	.0112	.1034	.1139	.0108	.1031

The development of the foregoing analysis points up the fact that there is a degree of uncertainty regarding the result of any attempt to produce basic male claim costs from the Intercompany claim investigation. Furthermore, gross rates based on such a table must be applied to groups made up of varying percentages of exposure on male and female lives. It is common practice in developing gross premium rates to assume that female morbidity costs, including the cost of a six weeks maximum maternity benefit, is twice that of males. This is quite convenient, as is borne out by its widespread application. In order to retain the maximum degree of simplicity in the application of this gross premium rate practice, the same rate is used for the 0-11% female grouping (which averages about 6% of female exposure, as indicated by the latest available Intercompany morbidity investigation) as is used when the appropriate loading factors are applied to obtain rates for the other percent female groupings. This latter practice produces some understatement of the costs for the 0-11% female grouping, and the over-all ratios of 215% produced by Mr. Miller's investigation and of 220% produced by my study would produce a further over-all understatement of claim costs. This suggests that claim costs should be derived or adjusted to compensate for those understatements.

One method for obtaining such claim costs would be to derive from the experience of exposure size groups 0-7 the equivalent all male exposure for each plan, using the two times loading for females in all but the 0-11% female grouping for which the actual exposure would be taken as the male exposure. The quotient of the total claims for the plan divided by the total equivalent male exposure would furnish its male claim cost. The female claim cost would, of course, be obtained by doubling the male cost. The resulting claim costs would then be applied to the male and female exposures of exposure size groups 0-9, which would produce an "expected" claims figure. The ratio of the total actual claims of exposure size groups 0-9, all plans, to the total "expected claims" could then be applied to adjust the male claim cost, which is also generally used as that for the 0-11% female grouping. This would result in upgrading the cost for the 0-11% female grouping and would further serve to eliminate some understatement of costs in the subsequent percentage female groupings when the two times assumption is used in determining the costs for those female groupings. In Table 6 is a set of rates derived in this way from the non-rated experience of exposure size groups 0 through 7, which were adjusted to reproduce the net claim costs of all exposure size groups (*i.e.*, 0 through 9).

The above costs for the 26-week plans are depressed quite a bit to com-

pensate for the fact that the experience indicates the female loading to be less than 200% for these plans, while the costs for the other plans have been increased somewhat as compared with Miller's basic claim costs. It might be quite difficult to fit a basic table around this set of values, if one were desired for interpolation and extrapolation purposes. If that proved to be the case, it might be preferable to correct for the understatements mentioned by use of an over-all adjustment factor applicable to the claim costs of all plans.

TABLE 6

Plan	Annual Male Claim Costs
1-4-13.....	.608
4-4-13.....	.594
1-8-13.....	.514
8-8-13.....	.491
1-8-26.....	.609
8-8-26.....	.606

TABLE 7

## "ADJUSTED" ANNUAL MALE CLAIM COSTS

Plan	Miller's	Nonrated, Nonjumbo Analysis
1-4-13.....	.600	.636
4-4-13.....	.591	.615
1-8-13.....	.518	.516
8-8-13.....	.500	.486
1-8-26.....	.675	.680
8-8-26.....	.656	.655

A suggested method would be to use the male claim costs previously derived as the cost applicable in the 0-11% female grouping. The costs for the remaining female groupings could then be obtained by loading the cost for the 0-11% grouping by the effective percentage female of each of those remaining female groupings, thereby making use of the assumption that female claim costs are twice male claim costs. The resulting claim costs could then be applied to the exposures of the corresponding percentage female grouping and the products summed to obtain an "expected" claims figure for each plan. The total "expected" claims for all plans divided into the total actual claims, all plans, would produce an

adjustment factor applicable to all plans. The adjustment factor applicable to Mr. Miller's basic male claim costs would be 1.039 and that applicable to the male claim costs shown in my Table 3 would be 1.050. The results of this method are shown in Table 7.

The differences between the claim costs shown in Tables 6 and 7 are the result of two different attempts to compensate for and accommodate the method, in general use currently, of doubling male claim costs to obtain female claim costs. The variation in claim costs shown in these tables is wide enough to suggest that some other more accurate, but admittedly less easily administered, method of obtaining female claim costs from male claim costs might be in order. In any event, it is important to note that the male claim costs set forth in Mr. Miller's basic table (or in my Table 3) are not entirely suitable for direct use in computing gross premium rates, if the customary female loading procedure is used.

(AUTHOR'S REVIEW OF DISCUSSION)

MORTON D. MILLER:

We are indeed indebted to those who have prepared discussions of this paper. The amplification of points referred to in the paper, the inclusion of other material, and the comparisons of this study with the 1931-35 study of Mr. Fitzhugh constitute extremely valuable additions to the subject.

Since 1935 the volume of group weekly indemnity insurance has grown tremendously, as the following figures from the Life Insurance Association's annual surveys show:

Calendar Year	Number of Individuals Covered on December 31st
1935.....	2,000,000
1940.....	3,840,000
1945.....	5,921,360
1946.....	7,135,000
1947.....	8,377,000
1948.....	9,498,000
1949.....	10,260,000
1950.....	15,104,000

(The exceptional increase in the number of individuals covered during 1950 is attributable primarily to coverage under the New York Disability Benefits law, which became effective July 1, 1950.) It can be seen from the numbers covered that group weekly indemnity benefits now insure a much more extensive proportion of the labor force and a much broader cross section of industry than in 1935.

Furthermore, as a consequence of the more widespread coverage, a substantially larger amount of data was available for inclusion in the 1947-49 study. Whereas the 1931-35 study included a total exposure, both male and female, of 2,760,729 life years, the exposed to risk on non-rated industries involved in the determination of claim costs for the 1947-49 study was in excess of 7,800,000 life years.

A typographical error is present in Table IX. The total shown for the claim cost for accidents under the 4-4-13 plan should be .056 instead of .053 as it appears in the table.

In Table VI, it was intended to include values for the 95th day of duration, the 186th day and the 368th day, but instead values appear for one week earlier. Under 4-day plans the value of  $l_t$  for the 95th day is 8,458, for the 186th day 4,382, and for the 368th day 2,272, and for the 8-day plans 13,176, 6,828 and 3,539, respectively. The corresponding values for  $s_t$  are 1,212,891, 673,973 and 112,896 under 4-day plans and 1,889,414, 1,049,876 and 175,818 under 8-day plans.