

COMMUTATION COLUMNS, NET PREMIUMS AND  
RESERVES FOR INDIVIDUAL AND FAMILY  
MAJOR MEDICAL EXPENSE INSURANCE

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AT THE December 1956 meeting of the N.A.I.C., the Subcommittee to Study Reserves for Guaranteed Renewable Accident and Health Policies adopted the report of Task Force 4, setting forth recommended valuation standards for various types of accident and sickness policies. In recommending reserves for individual and family group major medical expense policies, the cost functions presented by the author in a discussion of a paper presented to the Society by Mr. Morton D. Miller ("Gross Premiums for Individual and Family Major Medical Insurance," *TSA VII*, 1; discussion by the author, *ibid.*, 404, tables on pp. 407-8) were suggested as one appropriate valuation basis.

In that discussion, annual claim costs,  $S_x$ , are shown for six plans of major medical expense insurance, together with a description of the policy benefits to which they apply and a description of the manner in which they were derived. This Note presents the commutation functions and net premiums required for reserve calculations, together with specimen reserve tables.

Tables 1 and 2 give values of the commutation function,  $M_{:65}K_x^{k/n}$ , for each of the six plans described in *TSA VII*. These have been calculated from the formula

$$M_{:65}K_x^{k/n} = \sum_{t=x}^{t=64} \frac{1}{2} (D_t + D_{t+1}) S_t^{k/n},$$

where

$k$  = Deductible Amount

$n$  = Maximum Benefit Amount, and

$D_t$  is on the basis of CSO mortality and  $2\frac{1}{2}\%$  interest.

Tables 3 and 4 show, for the three plans with \$25 limit on hospital room and board expense, the net annual premiums on the net level basis and the mean net single premiums.

Tables 5, 6, and 7 show, for the same three plans, the midterminal reserves on the 2 year preliminary term basis for the first 15 durations and for quinquennial ages at issue. These have been calculated by the prospective method from Tables 3 and 4.

TABLE 1  
 INDIVIDUAL AND FAMILY GROUP MAJOR MEDICAL EXPENSE INSURANCE  
 COMBINED WITH CSO 2½%  
 75% BENEFIT IN EXCESS OF DEDUCTIBLE AMOUNT  
 \$15 LIMIT ON HOSPITAL ROOM AND BOARD EXPENSE

$M:66 \frac{K \frac{1}{2}}{n}$

AGE	$k/n:$					
	\$250/\$5,000		\$500/\$7,500		\$750/\$10,000	
	Male	Female	Male	Female	Male	Female
25	196,788,327	349,468,402	125,209,957	225,881,004	108,745,559	179,082,458
26	191,906,216	339,634,221	122,326,663	220,244,339	106,192,070	174,824,977
27	187,069,661	329,771,538	119,463,617	214,537,690	103,654,702	170,513,395
28	182,266,174	319,895,078	116,631,640	208,779,179	101,153,674	166,135,414
29	177,511,982	310,018,865	113,817,747	202,976,674	98,680,023	161,730,660
30	172,808,688	300,147,312	111,019,019	197,137,793	96,234,489	157,282,202
31	168,144,793	290,284,891	108,245,892	191,256,852	93,817,783	152,800,864
32	163,526,731	280,436,124	105,499,560	185,345,901	91,422,137	148,296,880
33	158,944,087	270,630,252	102,764,757	179,412,281	89,048,689	143,763,512
34	154,399,411	260,850,619	100,051,517	173,463,104	86,698,545	139,206,865
35	149,887,445	251,105,702	97,361,393	167,509,169	84,376,665	134,640,631
36	145,429,900	241,415,059	94,684,607	161,553,226	82,080,126	130,058,847
37	141,002,913	231,786,088	92,023,297	155,601,835	79,791,692	125,471,012
38	136,574,211	222,215,407	89,361,817	149,654,315	77,509,917	120,879,072
39	132,152,464	212,721,048	86,682,596	143,724,215	75,219,838	116,288,582
40	127,702,503	203,283,255	83,979,879	137,800,956	72,907,996	111,698,307
41	123,218,622	193,929,956	81,242,249	131,901,283	70,562,382	107,104,273
42	118,693,006	184,665,162	78,456,530	126,025,205	68,181,801	102,515,845
43	114,113,061	175,490,056	75,623,355	120,173,222	65,750,322	97,941,986
44	109,465,079	166,418,091	72,731,998	114,361,034	63,262,753	93,385,372
45	104,743,154	157,453,567	69,776,159	108,586,306	60,717,764	88,840,341
46	99,951,136	148,601,031	66,753,544	102,855,759	58,106,445	84,321,600
47	95,085,465	139,865,243	63,662,789	97,168,022	55,432,061	79,821,588
48	90,156,914	131,240,924	60,508,620	91,530,234	52,695,697	75,344,370
49	85,158,879	122,736,545	57,301,112	85,937,018	49,911,540	70,889,221
50	80,117,920	114,353,367	54,035,781	80,384,274	47,081,106	66,453,753
51	75,033,639	106,098,070	50,730,420	74,876,110	44,211,209	62,043,516
52	69,913,696	97,964,165	47,386,283	69,419,299	41,306,562	57,650,850
53	64,772,786	89,959,800	44,011,957	64,007,927	38,374,419	53,278,393
54	59,615,144	82,091,301	40,612,039	58,656,358	35,422,185	48,931,532
55	54,452,037	74,369,416	37,193,734	53,360,559	32,453,448	44,620,031
56	49,295,045	66,793,423	33,770,296	48,125,718	29,480,013	40,338,361
57	44,126,999	59,338,567	30,327,356	42,934,040	26,489,708	36,075,586
58	38,926,189	51,958,733	26,838,139	37,752,344	23,455,757	31,799,210
59	33,652,926	44,612,647	23,279,516	32,550,386	20,363,105	27,484,421
60	28,299,648	37,267,488	19,641,688	27,299,782	17,202,317	23,105,759
61	22,845,491	29,898,670	15,909,976	21,989,788	13,946,642	18,653,233
62	17,286,901	22,491,016	12,077,940	16,606,418	10,597,528	14,118,894
63	11,624,537	15,039,615	8,146,642	11,146,282	7,155,620	9,495,978
64	5,856,937	7,542,499	4,117,467	5,607,757	3,621,502	4,785,941

**TABLE 2**  
**INDIVIDUAL AND FAMILY GROUP MAJOR MEDICAL EXPENSE INSURANCE**  
**COMBINED WITH CSO 2½%**  
**75% BENEFIT IN EXCESS OF DEDUCTIBLE AMOUNT**  
**\$25 LIMIT ON HOSPITAL ROOM AND BOARD EXPENSE**

*M:asK<sub>2</sub>/n*

Age	<i>k/n.</i>					
	\$250/\$5,000		\$500/\$7,500		\$750/\$10,000	
	Male	Female	Male	Female	Male	Female
25	244,734,417	417,053,809	171,969,600	289,079,200	149,375,075	235,138,858
26	238,742,962	405,280,775	168,116,880	281,808,502	146,087,021	229,597,137
27	232,798,131	393,468,887	164,276,801	274,449,161	142,801,080	223,968,262
28	226,893,057	381,635,100	160,461,433	267,016,995	139,538,870	218,247,574
29	221,039,976	369,800,197	156,658,999	259,527,074	136,297,376	212,472,656
30	215,241,333	357,970,428	152,872,221	251,989,285	133,073,921	206,633,775
31	209,490,789	346,147,693	149,103,724	244,400,132	129,870,481	200,739,794
32	203,786,870	334,342,692	145,364,488	236,769,555	126,680,511	194,803,493
33	198,124,267	322,582,216	141,635,957	229,111,284	123,506,332	188,824,704
34	192,506,265	310,855,435	137,925,203	221,434,412	120,350,196	182,811,686
35	186,924,451	299,172,389	134,238,880	213,747,789	117,218,178	176,776,350
36	181,405,227	287,554,159	130,568,182	206,060,029	114,108,438	170,718,757
37	175,921,759	276,013,286	126,912,536	198,375,862	111,001,139	164,646,730
38	170,432,014	264,540,534	123,250,340	190,703,703	107,881,885	158,567,910
39	164,946,155	253,159,012	119,562,107	183,051,739	104,741,205	152,489,730
40	159,420,452	241,853,705	115,833,761	175,414,643	101,574,115	146,409,453
41	153,847,998	230,653,721	112,056,156	167,810,836	98,353,755	140,328,351
42	148,220,028	219,564,234	108,208,911	160,241,970	95,074,960	134,257,556
43	142,520,203	208,584,539	104,289,330	152,710,167	91,721,406	128,207,768
44	136,731,594	197,735,317	100,280,819	145,235,669	88,284,788	122,183,370
45	130,845,594	187,016,120	96,192,582	137,814,686	84,761,177	116,180,391
46	124,866,613	176,435,587	92,002,326	130,458,275	81,142,320	110,215,212
47	118,791,864	166,002,286	87,718,507	123,158,434	77,429,677	104,279,253
48	112,633,110	155,706,747	83,344,450	115,934,535	73,630,747	98,378,403
49	106,389,925	145,561,260	78,896,772	108,772,429	69,758,329	92,511,253
50	100,087,524	135,565,840	74,372,403	101,672,317	65,817,827	86,674,985
51	93,729,278	125,726,194	69,790,760	94,637,711	61,817,575	80,874,967
52	87,326,561	116,039,574	65,159,387	87,675,035	57,766,239	75,105,829
53	80,897,740	106,513,328	60,488,564	80,780,420	53,672,829	69,368,187
54	74,448,624	97,153,239	55,786,858	73,970,270	49,548,778	63,667,961
55	67,994,246	87,973,723	51,065,398	67,240,605	45,399,676	58,017,657
56	61,548,006	78,971,772	46,337,522	60,594,997	41,241,424	52,412,561
57	55,091,130	70,120,834	41,587,573	54,014,509	37,058,633	46,839,142
58	48,592,289	61,366,513	36,779,473	47,456,588	32,813,535	41,254,309
59	42,005,685	52,660,655	31,884,293	40,883,251	28,485,480	35,626,179
60	35,320,801	43,966,515	26,884,846	34,261,551	24,059,430	29,926,968
61	28,510,613	35,253,680	21,764,066	27,574,502	19,503,287	24,139,435
62	21,571,636	26,505,526	16,513,179	20,807,895	14,813,672	18,256,048
63	14,504,467	17,715,380	11,132,585	13,955,087	10,000,662	12,268,772
64	7,307,694	8,879,448	5,623,331	7,015,387	5,060,279	6,179,195

TABLE 3

INDIVIDUAL AND FAMILY GROUP MAJOR MEDICAL EXPENSE INSURANCE  
 COMBINED WITH CSO 2½%  
 75% BENEFIT IN EXCESS OF DEDUCTIBLE AMOUNT  
 \$25 LIMIT ON HOSPITAL ROOM AND BOARD EXPENSES  
 NET ANNUAL PREMIUMS

AGE	<i>k/n:</i>					
	\$250/\$5,000		\$500/\$7,500		\$750/\$10,000	
	Male	Female	Male	Female	Male	Female
25	\$20.7043	\$35.2823	\$14.5484	\$24.4558	\$12.6370	\$19.8925
26	21.1017	35.8215	14.8593	24.9081	12.9122	20.2934
27	21.5134	36.3614	15.1812	25.3625	13.1966	20.6974
28	21.9396	36.9025	15.5159	25.8194	13.4928	21.1036
29	22.3826	37.4462	15.8634	26.2799	13.8016	21.5151
30	22.8442	37.9924	16.2248	26.7443	14.1235	21.9306
31	23.3251	38.5407	16.6015	27.2120	14.4600	22.3507
32	23.8268	39.0914	16.9961	27.6832	14.8115	22.7765
33	24.3506	39.6472	17.4079	28.1591	15.1796	23.2076
34	24.8987	40.2060	17.8392	28.6403	15.5661	23.6448
35	25.4724	40.7686	18.2929	29.1277	15.9735	24.0895
36	26.0778	41.3371	18.7697	29.6220	16.4036	24.5415
37	26.7141	41.9133	19.2720	30.1238	16.8558	25.0020
38	27.3778	42.4952	19.7986	30.6342	17.3299	25.4720
39	28.0729	43.0863	20.3488	31.1544	17.8264	25.9529
40	28.7948	43.6840	20.9221	31.6837	18.3465	26.4447
41	29.5438	44.2930	21.5184	32.2251	18.8871	26.9476
42	30.3203	44.9146	22.1355	32.7795	19.4488	27.4641
43	31.1224	45.5491	22.7739	33.3477	20.0294	27.9970
44	31.9478	46.2015	23.4323	33.9348	20.6280	28.5485
45	32.7945	46.8728	24.1092	34.5412	21.2441	29.1189
46	33.6638	47.5667	24.8036	35.1713	21.8758	29.7138
47	34.5547	48.2875	25.5159	35.8249	22.5231	30.3332
48	35.4703	49.0350	26.2468	36.5100	23.1877	30.9812
49	36.4102	49.8159	27.0011	37.2256	23.8736	31.6604
50	37.3829	50.6342	27.7783	37.9749	24.5831	32.3733
51	38.3911	51.4969	28.5860	38.7632	25.3202	33.1260
52	39.4411	52.4094	29.4293	39.5985	26.0902	33.9216
53	40.5452	53.3835	30.3163	40.4864	26.9003	34.7667
54	41.7127	54.4339	31.2568	41.4447	27.7616	35.6724
55	42.9626	55.5867	32.2660	42.4864	28.6860	36.6588
56	44.3206	56.8675	33.3676	43.6344	29.6979	37.7422
57	45.7990	58.2936	34.5730	44.9039	30.8080	38.9388
58	47.4008	59.8619	35.8777	46.2930	32.0090	40.2428
59	49.1089	61.5656	37.2759	47.7966	33.3024	41.6506
60	50.9324	63.3995	38.7678	49.4050	34.6936	43.1545
61	52.8525	65.3527	40.3458	51.1171	36.1548	44.7493
62	54.8695	67.4192	42.0028	52.9268	37.6800	46.4360
63	56.9858	69.6010	43.7382	54.8273	39.2910	48.2021
64	59.1676	71.8935	45.5300	56.8009	40.9711	50.0306

TABLE 4  
 INDIVIDUAL AND FAMILY GROUP MAJOR MEDICAL EXPENSE INSURANCE  
 COMBINED WITH CSO 2½%  
 75% BENEFIT IN EXCESS OF DEDUCTIBLE AMOUNT  
 \$25 LIMIT ON HOSPITAL ROOM AND BOARD EXPENSE  
 MEAN NET SINGLE PREMIUMS

Age	<i>k/n:</i>					
	\$250/\$5,000		\$500/\$7,500		\$750/\$10,000	
	Male	Female	Male	Female	Male	Female
25	\$483.773	\$822.815	\$340.299	\$571.234	\$295.648	\$465.023
26	485.047	821.603	341.919	572.185	297.168	466.558
27	486.161	819.707	343.442	572.637	298.603	467.678
28	487.116	817.137	344.866	572.594	299.971	468.395
29	487.927	813.888	346.178	572.057	301.264	468.715
30	488.585	809.935	347.379	571.000	302.480	468.610
31	489.074	805.254	348.480	569.401	303.609	468.079
32	489.384	799.856	349.469	567.257	304.644	467.112
33	489.505	793.723	350.328	564.564	305.587	465.691
34	489.428	786.824	351.070	561.317	306.446	463.819
35	489.171	779.164	351.690	557.511	307.227	461.484
36	488.729	770.753	352.172	553.132	307.898	458.673
37	488.003	761.564	352.479	548.170	308.407	455.380
38	486.931	751.577	352.542	542.617	308.712	451.599
39	485.448	740.771	352.300	536.446	308.780	447.310
40	483.452	729.130	351.698	529.647	308.547	442.485
41	480.884	716.668	350.663	522.215	307.942	437.110
42	477.667	703.353	349.127	514.124	306.902	431.190
43	473.697	689.178	347.031	505.373	305.354	424.718
44	468.876	674.136	344.298	495.955	303.237	417.664
45	463.131	658.200	340.854	485.848	300.483	410.014
46	456.391	641.352	336.637	475.012	297.025	401.746
47	448.592	623.540	331.593	463.427	292.822	392.813
48	439.668	604.712	325.690	451.051	287.848	383.178
49	429.573	584.827	318.880	437.802	282.072	372.780
50	418.265	563.829	311.116	423.622	275.450	361.568
51	405.663	541.637	302.367	408.457	267.940	349.470
52	391.711	518.169	292.578	392.228	259.494	336.398
53	376.334	493.347	281.689	374.872	250.067	322.277
54	359.434	467.100	269.633	356.308	239.597	307.049
55	340.919	439.314	256.344	336.411	228.024	290.615
56	320.586	409.749	241.672	314.993	215.219	272.792
57	298.070	377.967	225.297	291.697	200.878	253.248
58	272.854	343.386	206.801	266.042	184.623	231.538
59	244.391	305.364	185.747	237.486	166.078	207.179
60	212.087	263.196	161.648	205.450	144.750	179.640
61	175.254	216.097	133.949	169.300	120.092	148.355
62	133.163	163.213	102.049	128.311	91.599	112.671
63	84.936	103.553	65.250	81.656	58.650	71.836
64	29.584	35.947	22.765	28.400	20.486	25.015

TABLE 5  
 INDIVIDUAL AND FAMILY GROUP MAJOR MEDICAL EXPENSE INSURANCE  
 COMBINED WITH CSO 2½%  
 75% BENEFIT IN EXCESS OF DEDUCTIBLE AMOUNT  
 \$25 LIMIT ON HOSPITAL ROOM AND BOARD EXPENSE  
 MIDTERMINAL RESERVES—2 YEAR PRELIMINARY TERM  
 \$250 DEDUCTIBLE, \$5,000 MAXIMUM BENEFIT

DURATION	AGE AT ISSUE							
	25	30	35	40	45	50	55	60
MALES								
3.....	\$ 4.73	\$ 5.26	\$ 5.91	\$ 6.13	\$ 5.74	\$ 5.24	\$ 4.84	\$2.06
4.....	14.19	15.80	17.68	18.14	16.82	15.26	13.58	4.21
5.....	23.69	26.34	29.28	29.60	27.13	24.40	20.30	2.15
6.....	33.21	36.91	40.61	40.43	36.65	32.60	24.56	
7.....	42.74	47.50	51.61	50.59	45.32	39.75	25.87	
8.....	52.27	58.02	62.21	60.00	53.12	45.54	23.73	
9.....	61.79	68.40	72.32	68.64	60.00	49.57	17.55	
10.....	71.31	78.58	81.84	76.44	65.91	51.41	6.68	
11.....	80.82	88.47	90.71	83.41	70.80	50.59		
12.....	90.34	98.01	98.85	89.48	74.54	46.61		
13.....	99.76	107.12	106.22	94.61	76.83	38.92		
14.....	109.03	115.70	112.76	98.76	77.24	26.91		
15.....	118.09	123.68	118.44	101.88	75.32	9.86		
FEMALES								
3.....	\$ 6.00	\$ 5.59	\$ 5.18	\$ 4.85	\$ 4.68	\$ 4.62	\$ 4.74	\$2.12
4.....	17.82	16.54	15.34	14.35	13.81	13.55	13.38	4.36
5.....	29.25	27.07	25.06	23.42	22.44	21.90	20.14	2.24
6.....	40.27	37.17	34.32	32.04	30.55	29.62	24.51	
7.....	50.87	46.85	43.15	40.22	38.09	36.57	25.95	
8.....	61.05	56.10	51.53	47.91	45.01	42.41	23.93	
9.....	70.82	64.91	59.44	55.09	51.29	46.69	17.79	
10.....	80.13	73.25	66.90	61.72	56.92	48.93	6.80	
11.....	88.98	81.10	73.88	67.80	61.85	48.60		
12.....	97.41	88.50	80.39	73.26	65.92	45.15		
13.....	105.37	95.41	86.37	78.06	68.80	37.99		
14.....	112.86	101.84	91.81	82.17	70.03	26.44		
15.....	119.86	107.78	96.68	85.57	69.10	9.74		

TABLE 6  
 INDIVIDUAL AND FAMILY GROUP MAJOR MEDICAL EXPENSE INSURANCE  
 COMBINED WITH CSO 2½%

75% BENEFIT IN EXCESS OF DEDUCTIBLE AMOUNT  
 \$25 LIMIT ON HOSPITAL ROOM AND BOARD EXPENSE  
 MIDTERMINAL RESERVES—2 YEAR PRELIMINARY TERM  
 \$500 DEDUCTIBLE, \$7,500 MAXIMUM BENEFIT

DURATION	AGE AT ISSUE							
	25	30	35	40	45	50	55	60
MALES								
3.....	\$ 3.71	\$ 4.14	\$ 4.69	\$ 4.88	\$ 4.58	\$ 4.21	\$ 3.94	\$1.69
4.....	11.14	12.43	14.02	14.45	13.45	12.27	11.08	3.45
5.....	18.58	20.74	23.21	23.60	21.71	19.64	16.58	1.76
6.....	26.04	29.09	32.22	32.26	29.32	26.29	20.09	
7.....	33.52	37.44	40.98	40.38	36.28	32.12	21.18	
8.....	41.01	45.76	49.41	47.90	42.55	36.87	19.44	
9.....	48.51	53.99	57.47	54.82	48.10	40.20	61.35	
10.....	56.02	62.07	65.09	61.08	52.89	41.75	5.48	
11.....	63.53	69.95	72.18	66.66	56.88	41.15		
12.....	71.05	77.55	78.70	71.53	59.99	37.96		
13.....	78.51	84.81	84.60	75.68	61.93	31.73		
14.....	85.87	91.67	89.86	79.05	62.35	68.92		
15.....	93.07	98.06	94.43	81.60	60.90	8.05		
FEMALES								
3.....	\$ 5.07	\$ 4.78	\$ 4.54	\$ 4.34	\$ 4.29	\$ 4.21	\$ 4.20	\$1.85
4.....	15.06	14.19	13.47	12.87	12.66	12.36	11.84	3.78
5.....	24.76	23.28	22.05	21.05	20.56	19.93	17.78	1.94
6.....	34.15	32.05	30.28	28.87	27.98	26.87	21.59	
7.....	43.21	40.49	38.15	36.29	34.87	33.03	22.83	
8.....	51.93	48.59	45.64	43.32	41.19	38.16	21.02	
9.....	60.33	56.34	52.77	49.92	46.91	41.87	15.59	
10.....	68.39	63.73	59.52	56.03	51.99	43.73	5.95	
11.....	76.10	70.74	65.89	61.61	56.36	43.31		
12.....	83.47	77.37	71.84	66.63	59.90	40.14		
13.....	90.47	83.60	77.36	71.03	62.32	33.69		
14.....	97.11	89.44	82.42	74.79	63.23	23.39		
15.....	103.36	94.88	86.96	77.86	62.20	8.60		

TABLE 7  
 INDIVIDUAL AND FAMILY GROUP MAJOR MEDICAL EXPENSE INSURANCE  
 COMBINED WITH CSO 2½%  
 75% BENEFIT IN EXCESS OF DEDUCTIBLE AMOUNT  
 \$25 LIMIT ON HOSPITAL ROOM AND BOARD EXPENSE  
 MIDTERMINAL RESERVES—2 YEAR PRELIMINARY TERM  
 \$750 DEDUCTIBLE, \$10,000 MAXIMUM BENEFIT

DURATION	AGE AT ISSUE							
	25	30	35	40	45	50	55	60
MALES								
3 .....	\$ 3.29	\$ 3.70	\$ 4.22	\$ 4.44	\$ 4.16	\$ 3.84	\$ 3.63	\$1.57
4 .....	9.87	11.12	12.63	13.14	12.23	11.22	10.22	3.21
5 .....	16.49	18.58	20.95	21.46	19.75	17.97	15.34	1.65
6 .....	23.15	26.09	29.13	29.35	26.71	24.07	18.60	
7 .....	29.82	33.62	37.08	36.72	33.06	29.44	19.60	
8 .....	36.51	41.11	44.76	43.56	38.79	33.83	17.99	
9 .....	43.22	48.54	52.10	49.85	43.87	36.92	13.32	
10 .....	49.96	55.86	59.03	55.56	48.27	38.42	5.08	
11 .....	56.74	63.01	65.49	60.66	51.96	37.92		
12 .....	63.52	69.93	71.43	65.12	54.84	34.99		
13 .....	70.26	76.56	76.80	68.92	56.67	29.26		
14 .....	76.90	82.81	81.58	72.02	57.12	20.26		
15 .....	83.43	88.65	85.76	74.39	55.87	7.44		
FEMALES								
3 .....	\$ 4.51	\$ 4.33	\$ 4.18	\$ 4.07	\$ 4.06	\$ 4.01	\$ 3.94	\$1.72
4 .....	13.41	12.87	12.42	12.08	11.99	11.73	11.10	3.51
5 .....	22.09	21.15	20.38	19.77	19.50	18.90	16.66	1.80
6 .....	30.51	29.16	28.02	27.13	26.57	25.45	20.20	
7 .....	38.67	36.90	35.35	34.17	33.15	31.25	21.34	
8 .....	46.58	44.35	42.36	40.83	39.17	36.06	19.63	
9 .....	54.20	51.51	49.07	47.10	44.59	39.50	14.55	
10 .....	61.56	58.38	55.44	52.92	49.38	41.20	5.55	
11 .....	68.62	64.91	61.46	58.26	53.50	40.74		
12 .....	75.40	71.11	67.12	63.07	56.80	37.71		
13 .....	81.87	76.97	72.38	67.28	59.04	31.62		
14 .....	88.03	82.51	77.23	70.85	59.82	21.93		
15 .....	93.88	87.68	81.59	73.75	58.76	8.05		



## DISCUSSION OF PRECEDING PAPER

JOHN A. FIBIGER:

Mr. Walker's note will be of value to many companies, particularly those where the company experience on major medical insurance is too small or too recent to have much statistical validity.

The great variations which exist in benefits under major medical plans in different companies make it difficult for a company to use any published results without some modification taking individual differences into account. It would be helpful to have some means of considering benefit variations in terms of some standard, for making studies of competitors' premium rates, modifying published reserve tables such as Mr. Walker's, and also as a possible method of modifying various company contributions to an intercompany experience study. A possible method of achieving this would be to define a particular "100% plan" and then assign percentage debits and credits for each variation in benefit provisions from the standard plan. If valid intercompany weights could be determined, individual company contributions to an experience study could be made with an appropriate percentage modification of total claims paid, rather than requiring a breakdown by type of expense incurred, except for special studies which would be necessary from time to time to check the accuracy of the percentage weights used.

As an example of the calculation of the weights, my company recently decided to liberalize the coinsurance provision, at the time 75-25, on a \$500 deductible, \$7,500 maximum major medical plan. Suggestions were made that the ratio be 80-20 and also that the reimbursement be 75% of the first \$500 of eligible expenses in excess of the deductible, 80% of the next \$1,500, 90% of the next \$2,500 and 100% of the remaining expenses, subject to the maximum amount. It was decided to use the analysis of expenses and number of claims by size presented on page 154 of the 1956 Reports as the basis for the study. Average expenses per claim for each of the expense groups were assumed, and the company payment under each of the three plans was determined. Using the frequencies presented, with various assumptions as to the frequency of claims between \$500 and \$1,000, an average payment for each plan was calculated. The 80-20 plan showed a consistent 6½% increase over the 75-25 regardless of the number of claims where expenses were less than \$1,000. The varying percentage plan ranged from 7% greater with no claims under \$1,000 to 5% greater with 75% of the claims under \$1,000.

To test this method, and also to obtain an idea of the rates charged by competitors, six other guaranteed renewable plans were analyzed, three issued by mutual companies and three by stock companies, using the plan finally adopted by my company as the standard. Assumptions, some of them virtually armchair guesses, were made as to the weights to be assigned to other differences in the plans. Using an assumed model office distribution of issue ages, the average premium after weighting ranged from \$84.79 to \$86.85 for the six companies, with the three stock companies having lower averages, as would be expected. The weights used ranged from 102% to 111%. This appeared to indicate that the method may have possibilities for use in intercompany comparisons and studies.

It would require a detailed and comprehensive study to initially establish the percentages to be used, but once this was done it might make a step toward reducing the problems which arise because of variations in coverage between companies.

CHRISTOPHER H. WAIN:

The providing of commutation columns, as Mr. Walker has so well done, is most helpful. However, it seems to me important in working with material such as this that we never, because of the complexity of the coverage, get to the point of placing undue reliance on the premium results produced from such commutation columns.

In medical care insurance, and major medical in particular, the job that one is charged with of coming out with satisfactory results at the end of the year is of maximum difficulty. This is both because the trend of medical care costs is up and because sharp variations in claim experience can occur in specific years in individual areas. Results can also be affected by the accuracy with which usual and customary charges can be determined as a basis for establishing claim liability when apparently excessive charges for treatment of an illness are made. All of these factors are hard to incorporate in a premium calculation made with commutation columns but must be carefully evaluated in determining the final gross premium level.