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DIGEST OF INFORMAL DISCUSSION

THE DOUBLE INDEMNITY STUDY

What conclusions can be drawn from it?

Atlanta Regional Meeting

MR. THOMAS E. GILL remarked that the Double Indemnity Study should fill a long felt need for up-to-date data. There has been a really remarkable change in both rates and shape of the curve. Motor vehicle and aircraft accidents appear to have played a major part in changing the shape.

The Committee has noted that results vary substantially among companies, much more so than total mortality rates do. Companies operating in Canada may want to take the precaution of determining to what extent Canadian and American experience differ before applying these rates to Canadian business. While there are very scanty data available which are directly comparable to the Double Indemnity Study for Canadian experience, some indication may be available.

The primary source is the population data. Rates for Canadian population data similar to the American data in Table 15 have been calculated and are set out in Table A. The source of these data is the "Vital Statistics" prepared by the Dominion Bureau of Statistics except for the 1951 population which was taken from the 1951 Census of Canada. For male ages under 60 the American and Canadian experience are quite similar. Canadian rates do not decrease as sharply after the peak in the early twenties and consequently the minimum rate is deferred to the early forties from the late thirties. Canadian female experience is definitely lower, averaging somewhat over 80% of the American experience.

There is no Canadian intercompany experience available so the following data, although scanty, may be of interest.

The first is the London Life's Ordinary double indemnity experience for calendar years 1940 to 1958 inclusive. This covers the war years, but Mr. Gill believed that exposures during those years were reasonably accurate. Exposures are increased for substandard cases and claims are for actual payment. There are only 238 claims in this experience.

The second experience was assembled in order to verify the apparent inconsistency of their double indemnity experience with available tables. It consists of the London Life standard life insurance for exposure and

accidental deaths between policy anniversaries in 1945 and 1954. The exposures were calculated by adding one half the nonaccidental death claims to the exposure for regular mortality. There were 1,255 accident claims. Like the first experience this was by amounts of insurance. There is, of course, some overlap and the second experience includes as standard some insurance which would be substandard for double indemnity.

The ratios of these two experiences to the 1951–56 aggregate table are set out in Table B. In view of the size of the experience decennial age

TABLE A

COMPARISON OF CANADIAN WITH AMERICAN POPULATION EXPERIENCE ACCIDENTAL DEATHS

Attained Age	Male			Female		
	Rates per 1,000		Ratio Canadian to American Data	Rates per 1,000		Ratio Canadian to American Data
	Canadian Data 1951–56	U.S. White Data 1952–55		Canadian Data 1951–56	U.S. White Data 1952–55	
15–19	.795	.882	90%	.182	.228	80%
20–24	1.145	1.213	94	.157	.194	81
25–29	.882	.869	101	.131	.158	83
30–34	.798	.738	108	.116	.151	77
35–39	.725	.719	101	.139	.173	80
40–44	.701	.745	94	.158	.188	84
45–49	.771	.797	97	.171	.211	81
50–54	.871	.873	100	.206	.252	82
55–59	.924	.933	99	.261	.289	90
60–64	1.034	1.110	93	.308	.372	83
65–69	1.157	1.338	86	.426	.556	77
70–74	1.415	1.660	85	.761	.950	80
75–79	2.134	2.583	83	.....	.....	.....
80–84	3.558	4.022	88	.....	.....	.....

groups are used. These results plus the population experience would suggest that Canadian and American experience are quite similar but that Canadian accidental death rates are slightly lower at the younger and older ages and slightly higher for ages 25 to 39.

In general, this study gives us a body of up-to-date information which will be as valuable for Canadian operations as for American. The use made of the results must depend on the field in which a company operates as well as on the best judgment of the actuary on the future course of accidental death rates.

MR. JAMES R. McDONNELL stated that perhaps the most significant result of the recently concluded Double Indemnity Study is the

substantial improvement in accidental death rates at all ages since the development of the 1926–1933 Intercompany Table about 25 years ago. As brought out in the report, claim rates for all years of issue and all ages combined were 49% of the expected according to the 1926–1933 Table.

The report points out that the improvement in claim rates has varied considerably by attained age. The greatest improvement has occurred at the higher ages, mainly at ages 50 to 69. At younger ages, there has been substantially less improvement.

It is of particular significance that the highest mortality ratios by

TABLE B

LONDON LIFE ACCIDENTAL DEATH EXPERIENCE—EXPECTED BY INTERCOMPANY AGGREGATE 1951–56 TABLE

Attained Age	Double Indemnity 1940–1958				Standard Insurance 1945–1954			
	Actual Claims		Expected Claims	A/E	Actual Claims		Expected Claims	A/E
	Amount	Number	Amount		Amount	Number	Amount	
10–19	27,000	7	40,817	66%	334,374	170	437,694	76%
20–29	288,063	68	247,649	116	1,072,514	412	1,165,697	92
30–39	264,320	77	264,576	100	1,092,871	358	916,390	119
40–49	222,435	56	217,591	102	599,882	184	650,903	92
50–59	96,800	30	104,843	92	404,160	131	347,066	117
Total	898,618	238	875,476	103%	3,503,801	1,255	3,517,750	100%

amount are shown for ages in the late teens and early twenties. This is reflected in the graduated 1951–1956 claim rates which, for ages 17 through 30, are from $\frac{2}{3}$ to $\frac{3}{4}$ of the 1926–1933 claim rates. Except for the very old ages, there is no other range of ages which shows such high ratios in relation to the 1926–1933 Table.

Over the past 30 years, life insurance mortality rates have also improved markedly but the incidence of such improvement by age has been almost the reverse of that brought out in the recent Double Indemnity Study. The greatest reduction in life insurance mortality rates has been at the younger ages, with relatively little improvement at the older ages.

Table Z (the basic ultimate mortality data underlying the 1941 CSO Table) and the basic table underlying the 1958 CSO Table provide trends in total mortality rates over much the same periods as the 1926–1933 and

1951–1956 Double Indemnity tables. On the basis of these mortality and double indemnity tables, the following conclusions may be drawn with respect to the trends of mortality and accidental death rates over the past 30 years:

1. *At ages under 35*, mortality rates decreased by about 60% while accidental death rates decreased by about 35%.
2. *In the age range 35–45*, mortality and accidental death rates each decreased by about 50%.
3. *At ages 45–55*, mortality rates decreased by about 35% while accidental death rates decreased by about 55%.
4. *At ages over 55*, mortality rates decreased by about 25% while accidental death rates decreased by about 60%.

These relative trends in mortality and accidental death rates are of interest when it is considered that accidents are the most important cause of death at the younger ages—particularly so, at ages under 30. Statistically, however, accidents have become of decreasing importance as a cause of death at the older ages.

With reference to the wide variations in individual company experience, Mr. McDonnell pointed out that, among the 17 contributing companies, the ratios of actual to expected according to the graduated 1951–1956 claim rates range from 50% to 169% by amount of claim. This is a considerably wider range than in the case of total mortality rates. For example, as shown in *TSA* IX, 21, the ratios of actual to expected for 15 large companies ranged from about 94% to 104% of Table X_{18}.

The report mentions that some of the analyses suggest antiselection by amount of insurance. While there is some indication of this, the results are not conclusive.

Table 11 of the report shows that, for male lives, the ratio by amount of claims for all ages combined is 110% for the under $5,000 group, 118% for the $5,000–$19,999 group and 130% for the $20,000 and over group. It is somewhat surprising that, for each of the three amount groups, the ratios by number of policies are higher than the corresponding ratios by amount, progressing from 116% to 123% to 144% for the three amount groups.

The report suggests that payments of less than the face amount under compromised claims are a possible explanation for this relationship between the amount and number ratios. While this may be a factor, it would, nevertheless, seem that any marked antiselection by amount would show up in the form of higher ratios by amount than by number. This applies particularly for the $20,000 and over group. Clearly, because of the large size policies in this group, the weighting by amount should be the major factor. And yet, except for ages under 35 where the ratios by

number and amount are about the same, the ratios by amount in the $20,000 and over group are less than they are by number.

In any event, it seems clear that more detailed analyses are required in order to substantiate antiselection under the larger amount policies issued with the double indemnity benefit.

MR. NEIL W. MACINTYRE pointed out that the high mortality ratios of actual to expected deaths in the first and third year are an interesting phenomenon. The report noted that an analysis of the first year deaths showed that the motor vehicle deaths had a high ratio of actual to expected. It is hypothesized that this was occasioned by suicides that were simulated as motor vehicle deaths. The analysis by cause of the third year deaths did not indicate that any particular cause was out of line. However, despite the failure to unearth specific evidence to account for the excess third year deaths, it would still seem significant that in most companies the suicide limitation period expires after two years. Mutual of New York carefully reviewed all the motor vehicle deaths of their entire contribution; there was no evidence that for their experience there were any hidden suicides in this classification.

With regard to size of policy, the accidental death rate for male lives up to attained age 44, by amounts of insurance, was significantly high for the larger size policies. At attained ages 45 to 54 the rate was approximately the same for all sizes and at attained ages 55 and up there was a decrease in the rate by size.

There was considerable variation in the experience by individual company. As would be expected, the three large companies that also sold industrial insurance showed a low ratio of actual to expected deaths and those companies that operated primarily in the farm area had a high ratio. His own company, Mutual of New York, had a ratio of actual to expected deaths of 107%. They rationalized that this was occasioned by the characteristics of their business. These included:

1) a larger average size policy than that of the intercompany experience, and
2) a smaller amount of female exposure.

By cause of death there are four causes for which their actual to expected was higher than 150% of the all company average, before taking into account the probable statistical deviations. These included accidents caused by machinery, by electric current, by a blow from falling objects and by suicides. Their suicide ratio was particularly high and they carefully analyzed their contribution for this cause. For this cause of death the comparison of an individual company's ratio of actual to expected deaths to the all company average is not a measure of the comparative suicide

rates experienced. This is true since the deaths have entered the experience for the amounts actually paid. Hence, to some degree, this ratio measures the claim administration, the success of the company in law suits, and the amount of business written in states with certain statutes. Also, since the number of deaths from this cause is very small, it is probable, from a statistical viewpoint, that some companies' ratio here will differ markedly from the average.

For an individual company, another factor that could affect the mortality ratios by cause of death (particularly suicide) would be a systematic bias in the coding. Certainly it is an anomaly to pay an accidental death claim for which the cause of death is suicide.

As the report notes, before this table is adopted as the basis for premium calculations, it would seem essential to incorporate in it a significant loading factor to allow for the variation of the experience of the individual company and also for less favorable economic conditions. From a consideration of the net premium, it seems evident that the reserves, based on the unweighted mortality rates, would be materially smaller than those of the intercompany table presently in general use. In view of the proposed federal income tax laws, the effect on net earnings of setting up smaller reserves should be carefully considered before a company adopts the new experience as an appropriate reserve basis.

They have calculated commutation columns to age 65, combining the 1951–1956 Intercompany Double Indemnity experience with the 1941 CSO Mortality Table assuming $2\frac{1}{2}\%$ interest and continuous functions (see table on pp. 427–28). They have also calculated a similar table except that the basic double indemnity mortality rate was modified by increasing it by a constant. Net premiums based on a percentage modification of the mortality rates may, of course, be obtained by multiplying the premiums calculated using the unweighted rates by the same percentage. Copies of these commutation columns will be made available on request.

MR. GEORGE MAYO questioned whether the apparent relationship between the size of insurance and the rate of claim was not in fact due to a relationship between the rate of claim and the income of the life assured. It might be expected that people in the higher income groups would be subject to certain special causes of accidental mortality to which the lower income groups would not be subject, occupational hazards excluded.

San Francisco Regional Meeting

MR. HAROLD J. BROWNLEE expressed the indebtedness of the Society to the Committee on Disability and Double Indemnity for their thorough and painstaking analysis of the data. He stated that perhaps the

ACCIDENTAL DEATH BENEFIT

NET ANNUAL PREMIUMS AND COMMUTATION COLUMNS

ACCIDENTAL DEATH RATES FROM 1951–1956 INTERCOMPANY EXPERIENCE COMBINED WITH 1941 CSO TABLE AND 2½% INTEREST

$$P(\bar{A}) = \frac{(d/\delta)\,\bar{M}_x^{ad}}{\bar{N}_x - \bar{N}_{65}}$$

Age	1,000P(Ā)	$\bar{C}_x^a$	M_x^{ad}	$\bar{N}_x$	$(d/\delta)M_x^{ad}$
1	.340	42848	1036191	3131444233	1023503
2	.337	34014	993343	3030677204	981180
3	.336	28381	959329	2932855591	947582
4	.338	24446	930948	2837778935	919549
5	.341	21527	906502	2745316759	895402
6	.344	19279	884975	2655369162	874138
7	.349	17651	865696	2567851064	855096
8	.354	16763	848045	2482684460	837661
9	.360	15993	831282	2399793710	821103
10	.366	15964	815289	2319103851	805306
11	.372	16233	799325	2240543054	789537
12	.378	17148	783092	2164047076	773503
13	.384	18876	765944	2089559769	756565
14	.388	21278	747068	2017030922	737920
15	.392	25189	725790	1946414344	716903
16	.393	32830	700601	1877665474	692022
17	.389	36264	667771	1810738945	659594
18	.383	36696	631507	1745589714	623774
19	.375	36028	594811	1682174079	587528
20	.367	34585	558783	1620449620	551941
21	.359	32430	524198	1560375151	517779
22	.351	29566	491768	1501910065	485746
23	.344	26109	462202	1445017579	456542
24	.338	22653	436093	1389658372	430753
25	.335	19783	413440	1335796551	408377
26	.333	17611	393657	1283396866	388837
27	.333	16088	376046	1232425248	371441
28	.334	14922	359958	1182848495	355550
29	.335	14088	345036	1134634721	340811
30	.337	13424	330948	1087753274	326896
31	.339	12872	317524	1042174423	313636
32	.342	12382	304652	997869312	300922
33	.344	11991	292270	954810123	288691
34	.348	11650	280279	912970009	276847
35	.351	11317	268629	872323227	265340
36	.355	11028	257312	832845060	254161
37	.359	10782	246284	794511726	243268
38	.363	10537	235502	757300495	232618
39	.368	10294	224965	721189408	222210
40	.372	10053	214671	686157561	212042

ACCIDENTAL DEATH BENEFIT

NET ANNUAL PREMIUMS AND COMMUTATION COLUMNS—*Continued*

Age	1,000 P($\bar{A}$)	$\bar{C}_x^{ad}$	$\bar{M}_x^{ad}$	$\bar{N}_x$	$(d/\delta)\bar{M}_x^{ad}$
41	.378	9879	204618	652184997	202112
42	.383	9767	194739	619252608	192354
43	.388	9710	184972	587342196	182707
44	.394	9672	175262	556436359	173116
45	.399	9622	165590	526518692	163562
46	.405	9531	155968	497573647	154058
47	.410	9403	146437	469586397	144644
48	.416	9214	137034	442542987	135356
49	.421	8995	127820	416430178	126255
50	.428	8749	118825	391235552	117370
51	.435	8524	110076	366947457	108728
52	.442	8320	101552	343554826	100308
53	.451	8153	93232	321047222	92090
54	.460	8020	85079	299414859	84037
55	.470	7935	77059	278648481	76115
56	.481	7872	69124	258739232	68278
57	.492	7825	61252	239678708	60502
58	.504	7773	53427	221458783	52773
59	.517	7713	45654	204071506	45095
60	.530	7659	37941	187509074	37476
61	.544	7607	30282	171763667	29911
62	.559	7581	22675	156827278	22397
63	.576	7559	15094	142691735	14909
64	.593	7535	7535	129348393	7443
65	.....	.....	0	116787947	0

most interesting thing that results from a comparison of the current study with the 1926–1933 study is the remarkable change in the patterns of accidental death by age and by cause of death. For example, in the 1926–1933 Table the rate at age 14 was a maximum point on the curve while the corresponding peak in the new study came at age 19. This is undoubtedly correlated with the sharp increase in deaths due to motor vehicle accidents and the minimum age for getting a driver's license.

Mr. Brownlee predicted that in another 25 years the pattern of causes of accidental death will have changed considerably, but it appears that the slope of the curve will be much flatter.

MISS J. CLUNAS F. McKIBBON presented a discussion similar to that presented by Mr. Thomas E. Gill at the Atlanta regional meeting.

MR. MARCUS GUNN observed that there has not been time since publication to do justice to the report by reexamining the double in-

demnity business in the light of its findings, but he offered some preliminary conclusions. He felt that, generally speaking, the report confirms our feeling as to the satisfactory trend of this business. The variation of the figures by companies in the study suggests the importance of each company looking into its own standards of underwriting and claim handling and its own experience in combination with the results of the report in its process of determining its double indemnity premium rates. The new table, when compared with corresponding figures of the first intercompany table, should enable companies to better determine their premium rates.

Mr. Gunn was of the opinion that the decidedly lower level of accidental death claims shown by the report leads to the conclusion that many companies might consider using a higher age for termination of the double indemnity benefit and that it will bring about the adoption of lower rates by companies which have not revised their double indemnity rates in recent years.

Mr. Gunn reasoned that, while motor vehicle deaths had shown an increase from 38.3% of the deaths (1934 report) to 55.2% of the deaths, the reduction in the total accidental death rate actually means that motor vehicle deaths are a greater proportion of a smaller relative number of deaths. Thus, he was of the opinion that motor vehicle death rates were not increasing as fast as is usually believed.

He observed also that, while the report shows that the accidental death claim rates for females are much lower than for males, the small percentages of the business on females suggests the continued practicability of using the same premium rates for both sexes; also, that the accidental death claim rates of the report increase much more slowly with the increase in age than do the rates in the 1934 report. Reserves based on the new mortality rates would, therefore, be much lower than those of the old table.

It appeared to Mr. Gunn that a comparison of the distribution of causes of death of this report with the corresponding distribution of the 1934 report shows a substantial decrease in the percentages of death losses due to those causes that often lead to controversies as to the validity of claims. Pertinent to this point is the fact that a summary of exclusions for 16 of the contributing companies shows changes in exclusions over the last two decades to have been few and relatively unimportant.

The lower claims cost of this report prompted Mr. Gunn to take a look at the double indemnity premium, claims, and net profit figures for 24 life companies which had sent him their annual statements for 1958. A fair distribution of companies of all types was included. The total of the

double indemnity premiums of these companies for 1958 was over $77,000,000. The total of the claims amounted to 30% of such total premiums. This is about the level of claims one would expect in the light of the downward trend shown by the experience of the report.

The main conclusion drawn from this report by Mr. Gunn was that the double indemnity benefit should be more aggressively sold to better serve the public.