GROUP RATE LEVELS IN WORKMEN'S COMPENSATION INSURANCE

BY

M. H. MC CONNELL, JR.

Prior to the introduction of group rate levels into the Workmen's Compensation rate making plan, there was no necessity for calculating the change in rates by industry group. Whenever a test of proposed rates was made, it was deemed sufficient to make a test of the aggregate change in rates. Although such tests did not reveal it, the average rate changes for the individual industry groups must have departed considerably from the average rate change of all groups combined, as a result of varying relativity among individual classifications. Since the introduction of group rate levels into rate making, attention has been focussed on the rate changes by industry group. The question naturally arises how much do group rate levels alter the rate changes by industry group?

In the attached tables an attempt has been made to measure statistically the effect of group rate levels upon the 1934 rate revisions. For this purpose only states in which the 1934 Program was adopted have been used. Since the 1934 Program included the principle of group rate levels, the problem is to find what the group rate changes in these states would have been, if rates had been keyed to a single rate level. A brief review of the effect of group rate levels upon rate making procedure will serve to pave the way for a solution.

The fundamental rate making formula for classifications with 100% local credibility is:—

$$\text{Manual rate} = \left\{ \frac{\text{Serious losses} \times \text{indemnity projection factor}}{\text{Payroll}} + \frac{\text{Non-Serious losses} \times \text{indemnity projection factor}}{\text{Payroll}} + \frac{\text{Medical losses} \times \text{medical projection factor}}{\text{Payroll}} \right\}$$
$$\times \text{ rate multiplier}$$

For such classifications the only effect of group rate levels is to change the projection factors in the above formula. Instead of

having one set of projection factors to be applied to all classifications, separate projection factors are calculated for each of the following industry groups: Manufacturing, Contracting and All Other.

For this purpose indemnity and medical policy year loss ratios must be calculated for each industry group. It is likewise necessary to calculate separate indemnity and medical rate level loss ratios for each industry group. For industry groups having $1,000,000 of premium or more during the rate level period, the rate level is determined entirely by group experience. For industry groups which have less than $1,000,000 of premium, the rate level loss ratio is obtained by formula-rating the group loss ratio against the loss ratio of all groups combined for the group rate level period. In the process, the group loss ratio is weighted by the ratio of the group premium to $1,000,000. The loss ratio so determined is split between indemnity and medical on the basis of group experience. A correction factor is then applied to the group rate level loss ratios to produce the desired over-all rate level loss ratio. The over-all rate level loss ratio is calculated the same way as it always has been. The rate level period for the groups is generally one year longer than the over-all rate level period, subject to a maximum of three years. Henceforth in this article "rate level period" means the over-all rate level period. If the rate period for groups is meant it is designated as "group rate level period."

Having determined the group rate level loss ratios and policy year loss ratios, it is a simple matter to calculate group projection factors. From this point on the rate revision proceeds in the usual manner, but care must be exercised to insure the projection of all losses by their appropriate factors.

In addition to the change in projection factors there is, for classifications whose rates are not determined entirely by local experience, another change caused by group rate levels. With a single rate level, reversion factors are so calculated that the national experience used will just equal, in total, the state experience which it replaces. With group rate levels, it is necessary to balance the eliminated state experience with the national experience not only in total, but also by industry group, if the desired group increases are to be realized. This is accomplished

by calculating separate reversion factors for each industry group. Reversion factors are simply correction factors designed to make the national experience balance the eliminated state experience in total. The theory of reversion factors is exactly the same as before the introduction of group rate levels and has been thoroughly explained by Messrs. Roeber and Greene in their article "The 'Permanent' Rate Making Method Adopted by the National Council on Compensation Insurance" published in Volume XII of the Casualty Actuarial Society *Proceedings*.

The other factors included in the rating structure are not changed by keying to group rate levels.* Furthermore, actual losses and payroll, the starting point of all rate revisions, cannot be affected by group rate levels. It is evident then, that the effect of group rate levels is brought into the rates solely through the projection factors and reversion factors. With this in mind, we can estimate the effect of group rate levels by modifying losses first by projection factors and reversion factors applicable to group rate levels, and then by projection factors and reversion factors applicable to a single rate level. A comparison of the results should show the effect of keying to group rate levels. The two methods should produce approximately the same results in the aggregate, but for the three industry groups, the results will in all probability be different. These differences represent the effect of keying to group rate levels.

Exhibit I shows the results of such a comparison for a number of states. Column (1) shows the changes in rates actually approved in these states as a result of the 1934 rate revisions. Column (2) shows the results that would have been obtained by keying to a single rate level. Column (3) shows the results that would have been obtained by keying to a single rate level, but with the national experience balanced against the eliminated state experience by industry group. The differences between columns (1) and (3) are entirely due to changing the projection factors, but the differences between columns (1) and (2) are due to the combined effect of changing both the projection factors and the reversion factors. It should be noted that in every instance the

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* Other factors at present included in the rating structure are, the expense multiplier, the correction for off-balance, and the contingency factor. They are the same for all classifications, and are not affected by group rate levels.

total change is the same for all three columns, showing that the methods all produce the same results in the aggregate.

The details of the calculation are more easily explained by means of an actual example. The complete calculations for the District of Columbia are shown in Exhibits II to IV. Exhibit II is divided into two parts, Part "A" showing the projection of District of Columbia experience by group projection factors, and Part "B" showing the same calculation using average projection factors based on the experience of all groups combined. The first three columns of Parts A and B, showing premiums and losses are identical. Columns (4) and (5) of Part A show the policy year loss ratios for indemnity and medical respectively. The figures shown in the parentheses of these columns are the rate level loss ratios. The indemnity and medical projection factors shown in columns (6) and (7) are obtained by dividing the rate level loss ratios by the policy year loss ratios. In columns (8) and (9) the losses have been extended by these projection factors. In columns (6) and (7) of Part B the same losses have been extended by the average projection factors of all groups combined. The calculation of these factors is shown under "All Groups" in columns (6) and (7) of Part A. The factors are repeated, for convenience, in columns (4) and (5) of Part B. The total losses converted to rate level by the two methods are shown in column (10) of Part A and column (8) of Part B. The corresponding loss ratios are shown in column (11) of each part—for Part B they are the upper figures of each pair. It might be mentioned that for Part A these ratios are the rate level loss ratios, as they should be. The resulting increases are shown in columns (12) of both Parts, and are obtained by dividing the loss ratios in columns (11) by the allowable loss ratio. These are the figures shown in columns (1) and (3) of Exhibit I —column (1) showing the figures from Part A and column (3) the figures from Part B.

Thus far the effect of national experience has been neglected. As previously explained, the national experience will just balance the eliminated state experience for each industry group when group rate levels are used. Consequently Part A, which is based on group rate levels, will not have to be adjusted for national experience. However, when rates are keyed to a single rate level

the national experience will not balance out by industry group, so an adjustment for the effect of national experience must be included in Part B. The amount of this adjustment is shown in column (9), and is added to the losses in column (8) to obtain the total losses on rate level, adjusted for the effect of national experience. The corresponding loss ratios and increases are shown in columns (11) and (12)—the lower figures of each pair. These are the figures shown in column (2) of Exhibit I. These figures approximate the results that would have been realized by keying to a single rate level.

The adjustment for national experience and the reversion factors are calculated in Exhibit IV. In columns (3), (5) and (7) are shown the District of Columbia serious, non-serious, and medical losses (all on Rate Level), grouped according to the local credibility indicated in column (2). The corresponding national experience is shown in columns (4), (6) and (8). The national experience is obtained by extending the District of Columbia payrolls by the national pure premiums. The resulting products are assigned to the same credibility groups to which the corresponding District of Columbia losses have been assigned. The amount of District of Columbia losses to be eliminated are calculated on lines (f), (l) and (r) of columns (3), (5) and (7). The national experience which will replace these eliminated losses is calculated on the same lines in columns (4), (6) and (8). Correction factors applicable to this national experience, to make it balance the eliminated local experience, are calculated in columns (9), (10) and (11). These factors are simply the ratios of the eliminated local experience to the national experience, and are known as reversion factors. These are the factors which should be used with group rate levels.

The eliminated District of Columbia experience and the substituted national experience are totaled for all groups on line (s). The District of Columbia experience has been put on rate level by group projection factors. Before calculating reversion factors for a single rate level, the experience should be placed on rate level by "All Group" projection factors, but this was not done because both sets of projection factors are supposed to produce the same effect over all. This introduces an error into the calculation for we cannot be sure that the two sets of projection fac-

tors will have the same effect on eliminated experience, even for all groups combined. That such an error would be large seems unlikely, and has been neglected for practical considerations. With this for an excuse, the reversion factors calculated on line (s) have been used as equivalent to the reversion applicable to a single rate level.

At the bottom of Exhibit IV the national experience has been converted to District of Columbia level by means of these factors. The converted experience is shown by industry group in columns (3), (6) and (9). The corresponding District of Columbia experience is shown in columns (4), (7) and (10). The excess of national experience over District of Columbia experience is shown on line (y). This excess is used as the "correction for national experience" shown in column (9) of Exhibit II, Part B.

Exhibit III is devoted to the calculation of the group rate level loss ratios. The first 5 columns showing premiums and losses and the corresponding loss ratios for 1930, 1931 and 1932 are taken from the first 5 columns of Exhibit II, Part A, line (f). The total loss ratios shown in column (6) are the sums of the indemnity and medical loss ratios. The amount of credibility granted each industry group is shown in column (7). In column (8) the industry group loss ratios are formula rated with the total loss ratio, according to the credibility indicated in column (7). The formula loss ratios are split into indemnity and medical in columns (9) and (10), the splits being based solely on group experience. Averages of these loss ratios weighted by the premiums of the rate level period are shown on line (d). The actual calculation of the average is made in columns (11), (12), and (13). In columns (14) and (15) the group formula loss ratios are multiplied by the quotient of rate level loss ratio for all groups combined over the average formula loss ratio, thereby forcing a balance with the desired rate level over all. The total rate level loss ratios are shown by group in column (16), and the corresponding required changes in rates are calculated in column (17). That these required changes are actually realized by projecting to group rate levels is shown by Exhibit II—Part A, column (12).

So much for the calculation of the tables. Let us now consider the results. As was to be expected, the change in rates by indus-

try group varies from the average change for all groups, in every state, even when rates are keyed to a single rate level. This is, no doubt, due to variations in relativity for individual classifications. At first glance it would seem that relativity would vary directly with the ratio of losses to payroll when rates are keyed to a single rate level, for then losses and payrolls are the only variables in the rate-making formula. This is not strictly true, however. In the first place amendment factors, though the same for all classifications, are applied separately by policy year and by kind of injury. Hence they will not have the same effect upon all classifications, unless the distribution of losses is substantially the same for all classifications, both by policy year and by kind of benefit. The chance for such an occurrence seems rather slight when it is recalled that five years of experience are used, and that there are six different kinds of benefits.

Furthermore, projection factors like amendment factors, will hardly affect all classifications alike, and for the same reason. They are also applied separately by policy year and kind of benefit, though for this purpose losses are only divided into two kinds of benefit, indemnity and medical.

Still, in all probability, it would not be far from the truth to assume that amendment factors and projection factors have little effect upon relativity under a single rate level. The very fact that their effect is dependent upon a varying distribution of losses would seem to indicate this. The classes most likely to have a freak distribution of losses are classes with a limited volume of experience, and for such classes the rates are determined mostly by national experience, with the result that factors applied to local experience are of little importance.

Nevertheless, there is one thing that has an important bearing upon relativity, namely national experience. The relativity prevailing among the national pure premiums* will doubtless be considerably different from the relativity prevailing among local pure premiums. Consequently the use of national experience will disturb the relativity established by local experience, especially since national experience is introduced in varying amounts for different classes, and for some classes not at all.

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* Relativity for national pure premiums is also determined by the ratio of losses to payroll, but for the experience of all states combined.

In this connection it should be mentioned that the importance of national experience decreases as the volume of local experience increases. Applied to individual classifications this means, that as the importance of a classification increases the importance of national experience decreases. In review, then, it would seem safe to say that when rates are keyed to a single rate level the most important forces acting upon relativity are national experience and local loss costs (as expressed by the ratio of losses to payroll). Furthermore, the relativity of important classes is governed chiefly by local loss costs, because national experience is of little consequence for such classes.

Let us now consider how this situation is affected by the introduction of group rate levels. Since it is not intended to alter the aggregate change in rates by keying to group rate levels, it must be the intention to change relativity in some way. How this is done is explained by our main proposition, that the effect of group rate levels is brought into the rates through the projection factors and reversion factors. By keying to group rate levels another variable is introduced into the fundamental rate making formula; for group rate level projection factors vary by industry group. Another variable is also introduced into the calculation of the national pure premiums, because keying to group rate levels requires separate sets of reversion factors for each industry group. These two new variables are the instruments by means of which relativity is changed.

Since the same projection factors and reversion factors are used for all classifications in the same industry group, relativity among classifications in the same group ought to be about the same as under a single rate level. In other words, the industry groups are raised or lowered as a whole, leaving the relativity within substantially the same as before. To be sure, the relativity of all classes within a group is changed in relation to all classes outside the group. Some idea of the extent of such changes can be obtained by noting the effect of group rate levels upon the group rate changes in Exhibit I.

Whether rates are keyed to group rate levels, or to a single rate level, the element of a classification rate which depends upon the ratio of classification losses to classification payrolls is the same. It might be expected, therefore, that there would be a

certain correspondence between the average rate changes for the several classification groups, produced by the two methods. The use of a single rate level will produce average rate changes for the groups, some above and some below the average. Using group rate levels the same groups should be expected to exhibit changes in the same direction, though most likely by somewhat different amounts than under the former method. Whichever method is used there should be no change in direction, merely a change in degree. Such a relation is shown in a general way by the figures in Exhibit I.

Furthermore, since group rate levels are commonly supposed to be more responsive to variations in loss cost (by industry group) than a single rate level, we should expect rate changes would fluctuate more violently (by industry group) when rates are keyed to a group rate level, than when a single rate level is used. Strangely enough, the figures do not exhibit a disposition toward such a tendency. In fact they seem to display the opposite tendency in not a few instances.

A great deal of the fluctuation under a single rate level may be attributed to national experience. Since the national experience is not balanced out except in total, there is almost sure to be a surplus or a deficit in each industry group. For example, we saw from Exhibit IV that there was a deficit of $45,615.00 for Contracting, and a surplus of $30,076.00 for All Other, in the District of Columbia, due to national experience. These surpluses and deficits naturally cause departures from the changes required by local experience. Sometimes these departures from local indications nullify the changes indicated by local experience; at other times they accentuate the changes indicated by local experience. It is probably the latter occurrence which causes the violent fluctuations noted in column (2) of Exhibit I.

When rates are keyed to group rate levels, national experience is balanced out by group, so there are, for a group as a whole, no departures from the changes indicated by local experience. When national experience is also balanced out by group under a single rate level, the relation between the results of the two methods of keying to rate level are more nearly in accord with our *a priori* views on the subject. For then the rate changes produced by a single rate level seem to fluctuate less violently by

industry group than do the changes produced by group rate levels. Column (3) shows the results of balancing the national experience by group when a single rate level is used. These figures correspond more closely to the figures in column (1).

It also seems natural to suppose that if the rate level loss ratio of a group is higher than the average over all rate level loss ratio the rates for the industry group will be increased by substituting group rate levels for a single rate level. This expectation, however, is not fulfilled by our tables, for in a number of states the largest figure in column (1) is exceeded by the corresponding figure in column (2).* From our previous discussion it should be clear that national experience is partly responsible for this situation. Nevertheless, even with the effect of national experience removed, as in column (3), the largest group increase for group rate levels is less, in some instances, than the corresponding increase for a single rate level. This is because the average over-all projection factors may, at times, exceed the group projection factors for the group with the highest group rate level loss ratio. This does not seem so strange when it is recalled that projection factors are measures of trend, and as such depend upon the relative, rather than the absolute, size of the loss ratios.

To illustrate this point the following example has been assumed:—

		(1)	(2)	(3)	(4)
	Policy Year	Policy Year Average Loss Ratio		Projection Factors	
		Single Group	All Groups Combined	Single Group	All Groups Combined
				(1f) ÷ (1)	(2f) ÷ (2)
(a)	1st	65.3	59.4	.1005	1.020
(b)	2nd	65.4	59.7	.1003	1.015
(c)	3rd	65.5	60.0	.1002	1.010
(d)	4th	65.6	60.3	.1000	1.005
(e)	5th	65.6	60.6	.1000	1.000
(f)	Rate Level	65.6 (Last 2 yrs.)	60.6 (Last yr.)		

Here is a group which has consistently had a higher loss ratio than the average of all groups combined, and yet the projection factors for the group are consistently lower than the projection

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* When group rates are used the highest group rate.level loss ratio produces the highest increase.

factors for all groups combined. Graphically the situation may
be depicted as follows:
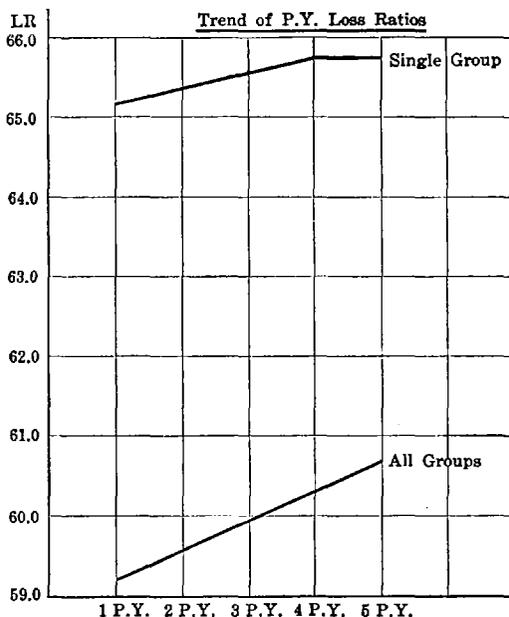
If in a case such as this, there should also happen to be a sub-
stantial surplus of national experience for the group, it is evident
that the increase for the group would be much greater under a
single rate level than under group rate levels. Perhaps such a
possibility was anticipated in 1933 when group rate levels were
adopted. In 1933, however, the insurance carriers were harassed
by high loss ratios and inadequate rates, so it seems likely that
group rate levels were adopted in the hope of securing the greatest
possible relief where the inadequacy in rates was most acute. It
was generally recognized that the application of group rate levels
would cause the industry group with the highest loss ratio to
receive the greatest increase in rates, but the possibility of secur-
ing an even greater increase for such a group by keying to a
single rate level may have been overlooked.

At any rate if it should ever be deemed desirable to make sure
that, for industry groups whose loss ratios exceed the average,

the rates will not be less than the corresponding rates resulting from the application of a single rate level, all that need be done is to modify the present procedure by the following rules:—

(To be applied only to industry groups whose rate level loss ratios exceed the loss ratio for all groups combined.)

1. Whenever the average projection factors for all groups combined (indemnity or medical) exceed the group projection factors, substitute the average projection factors for the group factors. Apply correction factors to the other industry groups to produce desired rate level over all.

2. Whenever a reversion factor (Serious, Non-serious or Medical) for all groups combined exceeds the corresponding group reversion factor, substitute the average reversion factor for the group factor. Apply correction factors to the corresponding reversion factors of other industry groups, so that in total the national experience will balance the state experience to be eliminated.

The application of these rules would guarantee that no group whose rate level loss ratio exceeded the average would lose by keying to group rate levels.

In the author's opinion no modification of the present rate making method is necessary in this respect. It seems perfectly justifiable to allow an industry to determine its own rate level provided the volume of exposure is sufficient. For this purpose an exposure of $1,000,000 of premium for the group rate level period (the present requirement) ought to be sufficient, especially since $1,500,000 of premium is supposed to be enough exposure for the rate level of a whole state. Since the group rate level is partly determined by the total rate level when there is less than $1,000,000 of exposure for a group, and since the influence of the total rate level is increased as the exposure decreases, there is a safeguard against violent fluctuations in rates due to inadequate exposure. At the same time the maximum responsiveness is granted to local experience. A departure from group indications would not seem to be justified merely because a larger increase could be obtained by keying to a single rate level.

An individual classification which developed $1,000,000 of premium for the rate level period would be almost certain to be self-rated, whether rates are keyed to group rate levels or not.

For example, the All Other group in the District of Columbia develops $2,687,032 of premium for the group rate level period and $4,600,368 of premium from 1928 to 1932. If all this experience had been concentrated in a single classification, it would undoubtedly have been self-rated. The $2,690,087 of losses on rate level, column (8), Exhibit II-B, without any national experience, would have been used to determine the rate. Yet because this is the experience of a group of classes, instead of a single class, it would be augmented by $30,076 of national experience, column (9), if rates were keyed to a single rate level. If group rate levels are used the national experience will balance out for the group as a whole and rates will be keyed to the $2,690,087 of local losses, just as if it were a single class. It would seem then, that in this instance at least, group rate levels produce more equitable results.

Prior to the introduction of group rate levels, an industry group was in much the same position as an individual class, except that an individual class, if large enough would be self-rated; whereas an industry group, however large, would never be self-rated, except by accident. Group rate levels permit a group with sufficient exposure to become self-rated.

Before concluding it should be mentioned that all tests and comparisons in this paper have been made on a five year basis. This is contrary to the accepted practice of making tests of rate changes on the basis of rate level years only. In the author's opinion a test should include all the years used in the calculation, for algebraically there is no reason to expect the test to check out with the required on any other basis. However, it is hardly worth while to discuss the matter because there is scarcely any difference between the results of using all five years or rate level years only. This is evidenced by the fact that tests based on rate level years usually come very close to the required, which five year tests ought to hit exactly.

The foregoing discussion may be summarized as follows:—

1. There was considerable variation in the average change in rates by industry group, even before group rate levels were adopted.

2. Since it is not intended to alter the over-all change in rates by keying to group rate levels, it must be intended to readjust relativity in some way.

3. The effect of group rate levels is brought into the rates through projection factors and reversion factors. This has the effect of changing relativity between classifications in different industry groups without changing relativity very much between classifications in the same industry group.

4. As a corollary to (3) it may be stated that it is possible for the industry group with the highest rate level loss ratio to receive a bigger increase in rates when a single rate level is used than when group rate levels are used. This is explained by the fact that the group projection factors and/or reversion factors for such a group might be less than the corresponding factors based on the experience of all groups combined.

EXHIBIT I

COMPARISON OF RATE CHANGES PRODUCED BY GROUP AND SINGLE RATE LEVELS
BASED ON EXPERIENCE USED IN 1934 RATE REVISIONS

	ALABAMA			CONNECTICUT		
	(1)	(2)	(3)	(1)	(2)	(3)
		SINGLE RATE LEVEL			SINGLE RATE LEVEL	
	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted
Manufacturing	1.074	1.096	1.110	.995	1.115	1.049
Contracting	1.203	1.074	1.182	.997	.906	.948
All Others	1.122	1.158	1.063	.941	.878	.915
All Groups	1.110	1.110	1.110	.972	.972	.972

	DISTRICT OF COLUMBIA			INDIANA		
	(1)	(2)	(3)	(1)	(2)	(3)
		SINGLE RATE LEVEL			SINGLE RATE LEVEL	
	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted
Manufacturing	1.000	1.067	1.045	1.037	1.139	1.096
Contracting	1.152	1.098	1.121	1.071	.877	.950
All Others	.998	1.019	1.009	1.057	1.045	1.056
All Groups	1.055	1.055	1.055	1.052	1.052	1.052

	IOWA			KANSAS		
	(1)	(2)	(3)	(1)	(2)	(3)
		SINGLE RATE LEVEL			SINGLE RATE LEVEL	
	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted
Manufacturing	.905	.993	.947	1.020	1.029	.983
Contracting	1.046	1.126	1.102	1.180	.960	1.059
All Others	.975	.896	.935	.912	1.059	.998
All Groups	.967	.967	.967	1.017	1.017	1.017

	KENTUCKY			LOUISIANA		
	(1)	(2)	(3)	(1)	(2)	(3)
		SINGLE RATE LEVEL			SINGLE RATE LEVEL	
	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted
Manufacturing	1.110	1.167	1.139	.936	1.117	1.016
Contracting	1.127	1.082	1.115	.965	.793	.889
All Others	1.127	1.111	1.111	.970	1.024	.997
All Groups	1.122	1.122	1.122	.962	.962	.962

EXHIBIT I (Cont'd)

COMPARISON OF RATE CHANGES PRODUCED BY GROUP AND SINGLE RATE LEVELS
BASED ON EXPERIENCE USED IN 1934 RATE REVISIONS

	MARYLAND			MISSOURI		
	(1)	(2)	(3)	(1)	(2)	(3)
		SINGLE RATE LEVEL			SINGLE RATE LEVEL	
	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted
Manufacturing	.916	1.008	.979	1.051	1.255	1.162
Contracting	.950	.793	.850	1.064	.924	.993
All Other	.861	.896	.874	1.036	1.013	1.015
All Groups	.902	.902	.902	1.047	1.047	1.047

	MONTANA			NEBRASKA		
	(1)	(2)	(3)	(1)	(2)	(3)
		SINGLE RATE LEVEL			SINGLE RATE LEVEL	
	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted
Manufacturing	1.130	1.108	1.184	1.090	1.020	1.018
Contracting	1.094	1.228	1.117	1.066	1.046	1.095
All Other	1.049	1.107	1.023	1.009	1.041	1.023
All Groups	1.073	1.073	1.073	1.039	1.039	1.039

	RHODE ISLAND			VERMONT		
	(1)	(2)	(3)	(1)	(2)	(3)
		SINGLE RATE LEVEL			SINGLE RATE LEVEL	
	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted	Group Rate Levels	Nat. Exper. Adjusted	Nat. Exper. Unadjusted
Manufacturing	.970	.974	.955	.964	.944	.950
Contracting	1.068	.877	1.052	1.020	1.017	1.017
All Other	.930	1.040	.951	.954	.977	.969
All Groups	.972	.972	.972	.972	.972	.972

EXHIBIT II—PART A

PROJECTION TO RATE LEVEL BY GROUP PROJECTION FACTORS

DISTRICT OF COLUMBIA

Policy Year	(1) Manual Premiums	(2) Losses on 1-3-29 Law Level Indemnity	(3) Losses on 1-3-29 Law Level Medical	(4) Loss Ratio Indemnity	(5) Loss Ratio Medical	(6) Projection Factor Indemnity	(7) Projection Factor Medical	(8) Losses on Rate Level Indemnity	(9) Losses on Rate Level Medical	(10) Total	(11) Loss Ratio	(12) Increase
M A N U F A C T U R I N G											
				(2)÷(1)	(3)÷(1)	(4g)÷(4)	(5g)÷(5)	(2)×(6)	(3)×(7)	(8)+(9)	(10)÷(1)	(11)÷58.0
(a) 1928	255500	73076	36891	28.6	14.4	1.101	1.840	80457	67879			58.0=
(b) 1929	256250	81682	45018	31.9	17.6	.987	1.506	80620	67797			Allowable
(c) 1930	252486	96237	68576	38.1	27.2	.827	.974	79588	66793			L.R.
(d) 1931	228279	50402	40975	22.1	17.9	1.425	1.480	71823	60643			
(e) 1932	199198	57609	39619	28.9	19.9	1.090	1.332	62794	52773			
(f) 1930-32	679963	204248	149170	30.0	21.9							
(g) 1928-32	1191713	359006	231079	(31.5)*	(26.5)*			375282	315885	691167	58.0	1.000
C O N T R A C T I N G											
(a) 1928	698991	219425	84106	31.4	12.0	1.379	1.958	302587	164680			
(b) 1929	770263	256975	111835	33.4	14.5	1.296	1.621	333040	181285			
(c) 1930	707139	246773	114899	34.9	16.2	1.241	1.451	306245	166718			
(d) 1931	645400	271710	114294	42.1	17.7	1.092	1.328	279590	151782			
(e) 1932	618311	314827	165429	50.9	26.8	.851	.877	267918	145081			
(f) 1930-32	1970850	833310	394622	42.3	20.0							
(g) 1928-32	3440104	1309710	590563	(43.3)*	(23.5)*			1489380	809546	2298926	66.8	1.152
A L L O T H E R S											
(a) 1928	952091	221596	145194	23.3	15.3	1.361	1.712	301592	248572			
(b) 1929	961245	246175	182078	25.6	18.9	1.238	1.386	304765	252360			
(c) 1930	935211	291712	197650	31.2	21.1	1.016	1.242	296379	245481			
(d) 1931	941725	341592	193742	36.3	20.6	.873	1.272	298210	246440			
(e) 1932	810096	199354	206994	24.6	25.6	1.289	1.023	256967	211755			
(f) 1930-32	2687032	832658	598386	31.0	22.3							
(g) 1928-32	4600368	1300429	925658	(31.7)*	(26.2)*			1457913	1204608	2662521	57.9	.998
A L L G R O U P S C O M B I N E D											
(a) 1928	1906582	514097	266191	27.0	14.0	1.330	1.807					
(b) 1929	1987758	584832	338931	29.4	17.1	1.221	1.480					
(c) 1930	1894836	634722	381125	33.5	20.1	1.072	1.259					
(d) 1931	1815404	663704	349011	36.6	19.2	.981	1.318					
(e) 1932	1627605	571790	412042	35.1	25.3	1.023	1.000					
(f) 1930-32	5337845	1870216	1142178	35.0	21.4							
(g) 1928-32	9232185	2969145	1747300	(35.9)*	(25.3)*					5652614	61.2	1.055

*From Exhibit III—Indemnity from column (14) and Medical from column (15).

EXHIBIT II—PART B

PROJECTION TO RATE LEVEL BY AVERAGE PROJECTION FACTORS — DISTRICT OF COLUMBIA

Policy Year	(1) Manual Premiums	(2) Losses on 1-3-29 Law Level Indemnity	(3) Medical	(4) Projection Factor Indemnity	(5) Medical	(6) Losses on Rate Level Indemnity	(7) Medical	(8) Total	(9) Correction for Nat'l Experience	(10) Losses on Rate Level Corrected for Nat'l	(11) Loss Ratio	(12) Increase
				$(2)\times(4)$	$(3)\times(5)$	$(6)+(7)$	from line (y) Exhibit IV	$(8)+(9)$	$(8)\div(1)$ or $(10)\div(1)$	$(11)\div 58.0$ 58.0 = Allowable L.R.		
MANUFACTURING												
(a) 1928	255500	73076	36891	*	*	97191	66662					
(b) 1929	256250	81682	45018	1.330	1.807	99734	66627					
(c) 1930	252486	96237	68576	1.221	1.480	103166	86337					
(d) 1931	228279	50402	40975	1.072	1.259	49444	54005					
(e) 1932	199198	57609	39619	.981	1.318	58934	39619					
				1.023	1.000							
(f) 1930-32	679963	204248	149170									
(g) 1928-32	1191713	359006	231079			408469	313250	721719	16308	738027	60.6 / 61.9	1.045 / 1.067
CONTRACTING												
(a) 1928	698991	219425	84106	1.330	1.807	291835	151980					
(b) 1929	770263	256975	111835	1.221	1.480	313766	165516					
(c) 1930	707139	246773	114899	1.072	1.259	264541	144658					
(d) 1931	645400	271710	114294	.981	1.318	266548	150639					
(e) 1932	618311	314827	165429	1.023	1.000	322068	165429					
(f) 1930-32	1970850	833310	394622									
(g) 1928-32	3440104	1309710	590563			1458758	778222	2236980	-45615	2191365	65.0 / 63.7	1.121 / 1.098
ALL OTHERS												
(a) 1928	952091	221596	145194	1.330	1.807	294723	262366					
(b) 1929	961245	246175	182078	1.221	1.480	300580	269475					
(c) 1930	935211	291712	197650	1.072	1.259	312715	248841					
(d) 1931	941725	341592	193742	.981	1.318	335102	255352					
(e) 1932	810096	199354	206994	1.023	1.000	203939	206994					
(f) 1930-32	2687032	832658	598386									
(g) 1928-32	4600368	1300429	925658			1447059	1243028	2690087	30076	2720163	58.5 / 59.1	1.009 / 1.019
ALL GROUPS COMBINED												
(a) 1928	1906582	514097	266191									
(b) 1929	1987758	584832	338931									
(c) 1930	1894836	634722	381125									
(d) 1931	1815404	663704	349011									
(e) 1932	1627605	571790	412042									
(f) 1930-32	5337845	1870216	1142178									
(g) 1928-32	9232185	2969145	1747300					5648786	769	5649555	61.2 / 61.2	1.055 / 1.055

*From projection factors for "All Groups Combined" shown in columns (6) and (7) of Part A.

EXHIBIT III

CALCULATION OF GROUP RATE LEVEL LOSS RATIOS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		INCURRED LOSSES		LOSS RATIOS				FORMULA LOSS RATIOS		
Group	P.Y. 1930-31-32 Premiums at 12-31-33 Manual Level	Indemnity On 1-3-29 Law Level	Medical on 1-3-29 Law Level	Indem. (2) ÷ (1)	Med. (3) ÷ (1)	Total (4) + (5)	Group Cred.	Total (6)×(7)+ (6d)×[1.−(7)]	Indem. (8)×(4) ÷ (6)	Med. (8)×(5) ÷ (6)
(a) Mfg.	679963	204248	149170	30.0	21.9	51.9	.68	53.3	30.8	22.5
(b) Cont.	1970850	833310	394622	42.3	20.0	62.3	1.00	62.3	42.3	20.0
(c) A.O.	2687032	832658	598386	31.0	22.3	53.3	1.00	53.3	31.0	22.3
(d) All	(a)+(b)+(c) 5337845	(a)+(b)+(c) 1870216	(a)+(b)+(c) 1142178	(2)÷(1) 35.0	(3)÷(1) 21.4	(4)+(5) 56.4	X X X	X X X X	(12d)÷(11d) 35.1	(13d)÷(11d) 21.5

	(11)	(12)	(13)	(14)	(15)	(16)	(17)
		FORM. EXPECTED LOSSES		RATE LEVEL—LOSS RATIOS			
Group	Rate Level Yrs. P. Y. 1931-32 Premiums at 12-31-33 Manual Level	Indemnity (11)×(9)	Medical (11)×(10)	Indemnity (9)×(14d) ÷ (9d)	Medical (10)×(15d) ÷ (10d)	Total (14) ÷ (15)	Change in Rates (16) ÷ 58.0 (Allowable Loss Ratio)
(a) Mfg.	427477	131663	96182	31.5	26.5	58.0	1.000
(b) Cont.	1263711	534550	252742	43.3	23.5	66.8	1.152
(c) A.O.	1751821	543065	390656	31.7	26.2	57.9	.998
(d) All	(a)+(b)+(c) 3443009	(a)+(b)+(c) 1209278	(a)+(b)+(c) 739580	RATE LEVEL—L. R.'s OVER ALL 35.9	25.3	61.2	1.055

Form used by National Council on Compensation Insurance.

EXHIBIT IV

DISTRICT OF COLUMBIA REVERSION FACTORS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		SERIOUS		**NON-SERIOUS**		**MEDICAL**		**REVERSION FACTORS**		
Cred. Group	Local Cred.	D. C. Losses on Manual Rate Level	National Experience	D. C. Losses on Manual Rate Level	National Experience	D. C. Losses on Manual Rate Level	National Experience	Ser.	N. S.	Med.
MANUFACTURING										
(a) I	1.00	—	—			112217	94902			
(b) II	.75	—	—	48012	98787	19354	14553			
(c) III	.50	—	—	22694	45659	64926	52120			
(d) IV	.25			44819	63194	126644	91044			
(e) V	.00	168603	289878	99792	192107	126644	91044			
		(3)×{1.00−(2)}	(4)×{1.00−(2)}	(5)×{1.00−(2)}	(6)×{1.00−(2)}	(7)×{1.00−(2)}	(8)×{1.00−(2)}	(3f)÷(4f)	(5f)÷(6f)	(7f)÷(8f)
(f)		168603	289878	156756	287029	185016	137411	.582	.546	1.346
CONTRACTING										
(g) I	1.00	—	—	459026	762662	548371	429207			
(h) II	.75	252278	386253	109282	221404	72629	63113			
(i) III	.50	—	—	61817	145586	34997	31801			
(j) IV	.25	152120	372866	59838	68917	100001	52442			
(k) V	.00	340615	472766	89108	126318	72114	44881			
		(3)×{1.00−(2)}	(4)×{1.00−(2)}	(5)×{1.00−(2)}	(6)×{1.00−(2)}	(7)×{1.00−(2)}	(8)×{1.00−(2)}	(3L)÷(4L)	(5L)÷(6L)	(7L)÷(8L)
(L)		517775	848979	192216	306150	182771	115891	.610	.628	1.577
ALL OTHERS										
(m) I	1.00	—	—	440001	760499	912059	699735			
(n) II	.75			58687	100002	31695	20392			
(o) III	.50	171076	266496	106614	162238	40871	40353			
(p) IV	.25	182333	272941	88786	165131	145170	111820			
(q) V	.00	299174	521169	144527	257629	102621	89987			
		(3)×{1.00−(2)}	(4)×{1.00−(2)}	(5)×{1.00−(2)}	(6)×{1.00−(2)}	(7)×{1.00−(2)}	(8)×{1.00−(2)}	(3r)÷(4r)	(5r)÷(6r)	(7r)÷(8r)
(r)		521462	859123	279095	487597	239858	199127	.607	.572	1.205
ALL GROUPS										
s = f + L + r		1207840	1997980	628067	1080776	607645	452429	(3s)÷(4s) .605	(5s)÷(6s) .581	(7s)÷(8s) 1.343

EXHIBIT IV (Cont'd)

DISTRICT OF COLUMBIA REVERSION FACTORS

CORRECTION FOR NATIONAL EXPERIENCE WHEN CONVERTED TO STATE LEVEL BY "ALL GROUP" CONVERSION FACTORS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		MANUFACTURING			CONTRACTING			ALL OTHERS		
	Reversion Factor	Nat'l. Experience	Nat'l. on D. of C. Level	D. of C. Experience	Nat'l. Experience	Nat'l. on D. of C. Level	D. of C. Experience	Nat'l. Experience	Nat'l. on D. of C. Level	D. of C. Experience
(t) Serious	.605	289878	(1)×(2) 175376	168603	848979	(1)×(5) 513632	517775	859123	(1)×(8) 519769	521462
(u) Non-Serious	.581	287029	166764	156756	306150	177873	192216	487597	283294	279095
(v) Medical	1.343	137411	184543	185016	115891	155642	182771	199127	267428	239858
(w) Total			526683	510375		847147	892762		1070491	1040415
(x) Eliminated D.C.			510375			892762			1040415	
(y) Ex. Nat. (w) − (x)			16308			−45615			30076	