THE RATE LEVEL ADJUSTMENT FACTOR IN WORKMEN'S COMPENSATION RATEMAKING

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Questions have been raised recently concerning the effectiveness and propriety of the Rate Level Adjustment Factor currently in use in New York and most other states for Workmen's Compensation ratemaking. I have undertaken to evaluate the current procedure on the basis of the information available to me—New York State data from two distinct sources.*

Analysis Based Upon Unit Report Data

The technique used is a comparison of policy year loss ratios developed to an ultimate status on two bases. The first is merely a development of the actual loss ratio. The second is a development of the loss ratio which would have resulted had rate level adjustment factors not been used in the ratemaking process.

The data found in this section have been taken from Exhibit A of the New York Workmen's Compensation Rate Filing effective 7/1/56. The following are the raw figures:

P.Y.	*Half*	*Report*	*Indem. Losses*	*Med. Losses*	*Stand. Prem.*	*Loss Ratio*
48	2	5	39,138,212	13,030,995	92,596,355	.563
49	1	5	46,555,513	16,309,340	109,754,030	.573
49	2	5	41,423,424	14,169,670	92,842,380	.599
50	1	5	50,285,743	18,922,692	116,610,899	.593
50	2	4	45,928,178	16,849,271	103,050,333	.609
51	1	4	53,512,056	20,858,178	127,419,662	.584
51	2	3	42,048,235	16,968,752	117,185,037	.504
52	1	3	50,932,674	21,378,423	155,529,202	.464
52	2	2	37,382,325	16,185,704	129,450,486	.414
53	1	2	48,246,335	20,630,696	167,657,411	.411

*(1) Unit Report Cards of CIRB.
(2) New York Supplemental Insurance Expense Exhibit.

In order to develop these to an ultimate basis the following factors have been used:

*Development Factors**

Development From	*To*	*Indemnity*	*Medical*	*Premium*
4th	5th	.9880	.9960	1.0001
3rd	4th	1.0061	.9972	1.0000
2nd	3rd	1.0197	1.0004	1.0002

From the record of past rate filings we have:

Rate Level Adjustment Factors and Wage Factors

Date of Revision	*RLAF*	*Wage Factor Used*	*Undiscounted Wage Factor#*
7/1/48	1.000	—	—
10/1/49	.999	—	—
10/1/50	1.000	—	—
7/1/51	1.057	—	—
1/1/52	1.023	—	—
12/1/52	1.022	.9830	.961
7/1/53	1.015	.9850	.966
7/1/54	.972	.9835	.962
7/1/55	.928	.9874	.969
7/1/56	.966	.9913	.980

* Derived as the averages of the indications of the latest three policy years.
# The undiscounted Wage Factor represents the Wage Factor which would have been indicated in the absence of The Rate Level Adjustment Factor.

Combining all the above data we arrive at the following table which represents an estimate of what would have occurred had no Rate Level Adjustment Factor been in use.

Analysis of Effect of Rate Level Adjustment Factor

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
P.Y.	*Half*	*Report*	*Developed Loss Ratio*	*RLAF**	*Wage Factor**	*Undiscounted* Wage Factor*	*Adjusted# Loss Ratio*
48	2	(5)	.563	1.0000	—	—	.563
49	1	(5)	.573	1.0000	—	—	.573
49	2	(5)	.599	.9995	—	—	.599
50	1	(5)	.593	.9990	—	—	.592
50	2	(4)	.603	.9995	—	—	.603
51	1	(4)	.578	1.0000	—	—	.578
51	2	(3)	.500	1.0570	—	—	.529
52	1	(3)	.462	1.0230	—	—	.473
52	2	(2)	.417	1.0228	.9972	.9935	.428
53	1	(2)	.414	1.0220	.9830	.961	.433

* Weight assigned to figures on previous exhibit on the basis of effective date.
\# (8) = (4) × (5) × (6) + (7).

The permissible loss ratio on a Standard Premium basis is about 56 per cent. From the above table we can see that where the Rate Level Adjustment Factor had an effect on the loss ratio, it was a disturbing one. That is, for the five periods where the adjusted loss ratio was different from the unadjusted loss ratio, the adjusted figure was closer to 56 per cent.

Analysis Based Upon Supplemental Insurance Expense Exhibit Data

In order to check on the results derived in the previous section, data from another source have been used. The information shown below can be found in "1955 Loss and Expense Ratios" published by the New York Insurance Department.

Loss Ratio Developments

P.Y.	Development From	12-24	24-36	36-48	48-60	60-72	72-84
1947							1.000
1948						1.003	.998
1949					1.008	.992	.995
1950				1.015	.994	.997	
1951			1.005	.987	.995		
1952		.813	.964	.994			
1953		.773	.974				
1954		.782					
Average		.789	.981	.999	.999	.997	.998

We can use the above factors to operate on the following set of loss ratios:

P.Y.	Loss Ratio as of 12/31/55	Developed
1948	.627	.627
1949	.639	.639
1950	.656	.655
1951	.597	.594
1952	.509	.506
1953	.480	.477
1954	.514	.501
1955	.708	.544

Combining these loss ratios with the Rate Level Adjustment Factors and Wage Factors as before we arrive at the following:

Analysis of Effect of Rate Level Adjustment Factor

(1)	(2)	(3)	(4)	(5)	(6)
P.Y.	Developed Loss Ratio	R.L.A.F.	Wage Factor	Undiscounted Wage Factor	Adjusted Loss Ratio
1948	.627	1.0000	—	—	.627
1949	.639	.9998	—	—	.639
1950	.655	.9993	—	—	.655

1951	.594	1.0285	—	—	.611
1952	.506	1.0229	.9986	.9968	.519
1953	.477	1.0185	.9840	.9635	.496
1954	.501	.9935	.9843	.9640	.508
1955	.544	.9500	.9855	.9655	.528

Since the above figures are on a Net Premium basis, the permissible loss ratio involved is about .595. It can be seen from these ratios that the use of the Rate Level Adjustment Factor accounted for "better" rates in two years and "worse" rates in three years.

From the two analyses made above it appears that more often than not, the Rate Level Adjustment Factor has produced a distorting influence upon the rates. If use of this factor is likely to produce unfavorable results then it represents not an improvement but a deterioration of the ratemaking process. Still, it is felt that there should be some method for bringing pure policy year results more up to date. A possible solution to this problem is presented in the second portion of this study.

*A "New" Rate Level Adjustment Factor Formula**

At the outset it is desirable to restate the origin and nature of the problem. Chiefly it is the result of a conflict between recentness and reliability. It has long been agreed that policy year data do not provide a sufficient degree of responsiveness to changing conditions to produce correct rate levels. In order to attain the desired responsiveness we have turned to the experience of the latest calendar year. This move, as has been demonstrated earlier, has also produced its attendant problems.

Calendar year experience is unreliable. Premiums do not correspond exactly to losses. Momentary situations can cause great swings in results. Even the weather may play a part. An inclement December might well cause a reduction in the number of audits and hence have an effect on premiums for two calendar years. These facts have never been disputed. They have been accepted but no account is taken of them in the Rate Level Adjustment Factor formula now being used. The current formula gives greater weight to calendar year results than to policy year results. It would seem that the problem could be solved by injecting the calendar year statistics into the ratemaking process in a slightly different fashion than is now the case in order to make optimum use of these figures.

While it is true that calendar year data are not sufficiently accurate for use in defining minute changes, still, for the purpose of reflecting gross modifications in the character of recent experience they can continue to serve a useful function. This thought leads directly to the

* The views and opinions set forth in this section of the paper are those of the author and should not be taken to reflect the position of the New York Insurance Department.

formulation of a system wherein the greater the deviation from "normal" indicated by calendar year statistics, the more the credibility assigned to them. A means of implementing this idea is one which is doubtless familiar to all actuaries. It is an adaptation of the first Rate Level Adjustment Factor procedure used in New York State. This formula, it will be remembered, incorporated the idea of a Neutral Zone. The exact formula would depend upon certain conditions to be established in advance. As an example let us set the following conditions:

PLR	= .565
Maximum Credibility	= .40
Maximum RLAF	= 1.10
Minimum RLAF	= .90

Then the loss ratio underlying a 1.10 RLAF would be determined as follows:

$$1.10 = \frac{.40 \text{ Loss Ratio (max)}}{.565} + .60$$

$$\text{Loss Ratio (max)} = .706$$

The Neutral Zone would be derived in the following manner:

$$\text{RLAF} = \text{Loss Ratio} - \text{PLR} \pm \text{NZ} + 1$$
$$1.10 = .706 - (.565 + \text{NZ}) + 1$$
$$\text{NZ} = .041 = .040 \text{ (rounded)}$$

In other words, under this neutral zone system any calendar year loss ratio between .525 and .605 would produce a Rate Level Adjustment Factor of unity. It can be seen that the credibilities implicit in this formula range from a low of 0 to a high of 40% depending upon the departure of the experience from normal.

By way of briefly justifying this type of approach it may be pointed out that for the two years where the Rate Level Adjustment Factor did produce some improvement in rates, the factors would have done likewise under the proposed system. For the remaining years where the effect of the Rate Level Adjustment Factor was a disturbing one, the factors produced under the proposed system would have been 1.000 since the results fell within the Neutral Zone.

A concluding word of caution appears in order. It will be noted that the suggested Rate Level Adjustment Factor formula produces an improvement in the rating procedure. However, the gap between the experienced and expected results remains uncomfortably large. Continued research into the problem is required in order that we may arrive at a more satisfactory method of prediction.