THE "PERMANENT" RATE MAKING METHOD ADOPTED BY THE NATIONAL COUNCIL ON COMPENSATION INSURANCE

BY

WINFIELD W. GREENE AND WILLIAM F. ROEBER

Compensation insurance has felt for some time the need of a reasonably stable rate making plan, Frequent and drastic changes in method have lessened the public's confidence in insurance carriers, strengthened "sales resistance" to needed rate increases, and disturbed company underwriting policy.

Considering the fact that the American compensation system is still in its teens, it is reasonable to assume that thus far these difficulties have been in the main, unavoidable. However, in April, 1925, the National Council after thorough investigation adopted an ostensibly permanent rate making plan.

Unlike the proverbial laws of the Medes and Persians, this plan can, be varied, or even changed, for good and sufficient reason duly established. The plan was, however, adopted with the intention of departing therefrom only for cause, and the record of the past year confirms the good faith of this undertaking.

History

The first American compensation insurance rates, made for New Jersey in 1911, were based upon "workmen's collective" experience, modified by underwriting judgment. These rates were shortly found to be redundant, and material reductions were made. For a time as other states adopted compensation laws their rates were established by reference to New Jersey.

The Massachusetts law (1912) required the insurance commissioner to approve rates as to adequacy and in 1914 the rates there were revised in the light of the first actual American compensation experience. The premium rates adopted for the New York law (1914) were based on the same data, and in the first national rate revision (also 1914) the new rates were in

all cases based on the Massachusetts experience modified by *"flat law differentials".

The rates resulting from the 1914 revisions appeared for the majority of states to be more than adequate. Some reductions were made for individual classifications and it was thought that no increase in rate levels would be required for a considerable time. But the experience of the 1916 policies began to look bad, and investigation indicated that the speeding up of industry due to war contracts had increased the accident rate. Another general revision took place in 1917 in which "relativities" were reviewed and rate levels substantially increased. The experience from a number of states was combined, still by the use of flat law differentials, the result being modified by factors (based largely on judgment) intended to cover increasing cost due to "†aging of the act", and "abnormal industrial activity".

The higher rates were hardly in effect before the experience bettered. Policy years 1918 and 1919 were consistently "good years" and in most states the period 1917 to 1920 was favorable throughout. The general increase had not been needed, at least not fully, because of material wage increases accompanied probably by a decline in the accident rate due to industry's having overcome the problem of war-time organization.

The general revision of 1920-21 resulted in substantially decreased rate levels (based upon policy year 1920 costs), and in material changes in relativity, due to new national experience combined by partial experience differentials.‡ Once

*A "flat law differential" is a factor intended to express the ratio of the cost of a given compensation law to that of some other compensation law. If, for example, in the 1914 revision the "law differential" for a certain state was 1.53, the implication was that for a typical array of accidents, the total, benefits (including medical and funeral benefits) of the act in question were 53% greater than those of the Massachusetts act. The weakness of the "flat law differential" lies in the fact that there is no such thing as a "typical" distribution of accidents according to nature and severity because human occupations differ as to the kind of accidents produced and no two states have the same "payroll distribution" according to industry.

†Both American and European experience demonstrates that during the first two or three years of any compensation law, employees do not as fully avail themselves of compensation benefits as they will later on after they have become fully educated as to its possibilities.

‡See foot note page 260.

more the rate level changes were made at about the wrong time, for the depression of 1921-22 marked the beginning of a period of rising compensation costs.

After the revision of 1920, the Actuarial Committee of the National Council on Workmen's Compensation Insurance kept in touch with the rate making problem and in 1922 it proposed that future rate revisions follow the assumption that compensation costs, *with due allowance for benefit changes and variations in wage rate,* may be regarded as stationary not only from year to year, but also from state to state. The revision of 1923-24 was committed to this principle "with reservations". This theory was followed in combining and converting experience, but not in fixing rate levels, because even with the wage variable eliminated changes in compensation cost were too momentous to be disregarded.

In spite of material wage increases, the loss ratio trend (on present manual rates and present law) was found for most states to be upward through policy years 1921, 1922 and 1923. Some felt that this up-swing was temporary, while others felt it to be a reflection of an underlying tendency toward increase which practically might be regarded as permanent. Still others felt the issue to be obscured by immaturity of available data. It is not surprising that consistency cannot be read into the conclusions of the 1923-24 revision.

It appears then that each rate revision prior to 1925 followed a theory conforming in each case to the view most generally prevailing at the moment as to probable future conditions. In fact, the unrealized ambition to achieve a constant loss ratio has been the only consistent element in the situation.

Realizing the urgency of promptly rechecking the results of the 1923-24 revision, the Council speeded up the collection of 1924 Schedule "Z", and prepared for a general review of rate levels, which took place in the fall of 1924. On that occasion the paramount importance of a permanent rate making policy was stressed and generally admitted. It was not, however, until the following spring, (1925) that the Rates Committee of the Council endorsed such a standard plan, after the most intensive and extensive examination of compensation rate making principles thus far made.

General Considerations

It is apparent that for the compensation business the foremost present consideration is the adherence to a definite rate making policy.

It is of nearly coordinate importance that this policy meet as fully as possible the following requirements:

1. *Equity.* Rates should be made according to a plan which assures that in the long run neither employers nor insurance companies shall pay more than their fair share of compensation cost, *i. e.*, that for the long run, rates will be both adequate and reasonable.

2. *Responsiveness.* Rates should be so made that they will be consistent with the latest available statistical evidence.

3. *Stability.* Both absolutely and relatively there should be as little yearly variation in class and individual risk rates as may be and still serve the major considerations of Equity and Responsiveness.

Rate Levels

The rate level should conform to the loss ratio of some stated period. The specific questions to be considered are:

1. How many years of experience shall be used?
2. To what extent shall loss ratio data† be employed?
3. Shall the experience of several years be combined by simple addition or shall a "weighted‡" formula be employed?

The formulas which seemed most worthy of consideration are as follows:

1. Five years Schedule "Z" unweighted.
2. Five years Schedule "Z" weighted (weights 1, 2, 3, 4, 5 in that order).

Notes.†—Loss ratio or "aggregate" data show premiums and losses for all kinds of injuries and all classifications (industries) combined, while Schedule "Z" includes an exhibit, *by classification*, of payrolls, premiums, and losses subdivided into the six (Fatal, Permanent Total, Permanent Partial Major, Permanent Partial Minor, Temporary and Medical) loss divisions. A sample of the form employed by the National Council in calling for loss ratio data is attached (Exhibit A).

‡By "weighting" we mean assigning progressively more weight to the experience of the later years. The weights used in the various tests were "1" assigned to the earliest policy year of the experience period, "2" to the next, and so on.

3. Three years including one year of loss ratio data.
4. Five years including one year of loss ratio data.

The method of fixing rate levels should be determined to satisfy the considerations of equity, responsiveness and stability, and according to these criteria the four formulas may be rated as shown in the table on page 258.

If we could safely assume that there is no persistent upward or downward trend in compensation costs, the most substantial advantages would be in favor of the use of five years Schedule "Z" unweighted. Although it is not generally maintained that an upward trend can continue indefinitely, it is true that the tendency thus far has been upward to a material degree and we are not justified in assuming that in the future there will not be extended periods when compensation costs will be subjected to successive changes in the one direction or the other. Tests indicate that the accumulated underwriting loss in the event of a protracted upward trend or the accumulated underwriting profit in the opposite event would be much less with the three year formula, using loss ratio data, than with the five year formula using Schedule "Z" only. The three year formula gives somewhat less stable rates but equity and responsiveness combined outweigh stability in importance.

The five years Schedule "Z" weighted and the five years including loss ratio data are half-way measures not wholly satisfactory from any standpoint.

Accordingly the use of three years experience including one year of loss ratio data was adopted as a standard to be used in determining rate levels. The Rates Committee approved the use of loss ratio data for the last year entering into the determination of the rate level with the understanding that the National Council Staff wherever possible will use experience brought down to at least twenty-seven† months and in no event less than twenty-four months developments*. In practice it is found possible in most states to wait for Schedule "Z" figures on the last year.

NOTE.—*This means loss ratio data reported as of a date 27 months after the inception date of the year of issue in question. For example 27 months developments on policy year 1923 would be reported as of April 1st, 1925. In practice it is not necessary to call for 27 months developments on loss ratio data because the annual revision dates have been so established that except for a few "July 1st states", for which 24 months developments are used, it is possible to bring in Schedule "Z" on all years.

Formula	Equity	Responsiveness	Stability
(1) 5 years Schedule "Z" unweighted	Satisfactory if underlying trend of compensation cost is neither consistently upward nor downward	Unsatisfactory because of lag†	Satisfactory
(2) 5 years Schedule "Z" weighted	Satisfactory if underlying trend is horizontal. If consistently upward or downward slightly less unfair than (1)	Unsatisfactory in slightly less degree than (1) and for same reason	Somewhat less stable than (1)
(3) 3 years with loss ratio data	If horizontal trend, just as satisfactory as either (1) or (2). If upward trend much fairer to carriers and if downward trend much fairer to employers than either (1) or (2)	Much shorter lag hence more satisfactory than either (1) or (2)	More unstable than either (1) or (2)
(4) 5 years with loss ratio data	Approximately on par with (2)	More satisfactory than either (1) or (2) but less so than (3) because of weight given older experience	Almost as stable as (1) and more stable than either (2) or (3)

NOTE.—†Lag as used in this paper means the time elapsing between the expiration date of the last policy issued during the experience period and the effective date of the rates based on the experience of that period.

Classification Pure Premiums

In fixing the standard for rate levels, it was necessary to choose to some extent between equity and responsiveness on the one hand, and stability on the other. In selecting a basis for classification pure premiums no such dilemma is presented, for the only criteria which particularly apply do not conflict. These criteria are:

(1.) Stability as to relativity, and

(2.) High credibility to class and state experience (recognition of the experience of the individual class and state to fullest extent possible).

Both these criteria point to the use of as long a period of experience as can be used without justifying the charge of "obsolete data", and unquestionably the general consensus of opinion favors five years.

In order to afford as broad as possible a use of local experience, the following principles were adopted:

1. Any classification in a given state shall be "self-rated" to the extent to which it conforms to the following standards.

(a) Serious†—expected losses‡ not less than 25 times the average state cost of a serious case

(b) Non-serious†—expected losses not less than 300 times the average state cost of a non-serious case.

(c) Medical†—expected losses not less than 80% of the non-serious standard.

2. Where the expected losses of a classification in a given state do not warrant full "credibility", the local pure premiums

Notes.—†Losses are shown in three divisions as follows:

(a) Serious—compensation (*indemnity*) for deaths, permanent total disabilities, and major permanent partial disabilities.

(b) Non-Serious—compensation (*indemnity*) for minor permanent partial disabilities and temporary disabilities.

(c) Medical—cost of medical and hospital treatment for all types of injuries.

‡Expected losses are the losses implied by a given set of payrolls and pure premiums (the latest national pure premiums in this instance). Accordingly these expected losses are obtained by applying the latest national pure premiums to the respective classification payrolls of the state in question.

are "weighted" against the national pure premiums in the following proportions:

Expected losses—proportion of self-rating Standard	Proportion of Local	Proportion of National
75—100%	.75	.25
50— 75%	.50	.50
25— 50%	.25	.75
00— 25%	.00	1.00

3. National pure premiums are to be reviewed every other year employing the five years' latest Schedule "Z" experience combined by the use of *"experience differentials." In conjunction with this bi-ennial revision, a continuous study is to be made of classification wordings and relativities from the engineering standpoint.

4. In translating the five most recent years of Schedule Z data upon the basis of the present law and latest medical costs†, to the rate level basis as already defined, the same factors are applied to all classifications. This is justified, on the ground that

*We have already defined "flat law differential" (see foot-note, page 254 of this paper). As opposed to "flat" differentials, we have "partial" differentials, *i. e.*, differentials applying to certain features of the Workmen's Compensation Act. The other major distinction in the matter of differentials is between "theoretical" and "experience" differentials. A theoretical differential reflects a comparison of the benefit scales as written in the respective laws without regard to the differences which may exist between two states in material and human conditions. The experience differential, on the other hand, reflects the result of a comparison of actual costs and in the experience differential, therefore, is involved not only differences in benefits but also the effect produced by variation between communities in such matters as the following:

A—Racial composition of population.

B—Economic development of the community.

C—Attitude of employees and employers towards the compensation law.

D—Type of administration and attitude of those administering the law.

†By this is meant—

(a) Payrolls as reported;

(b) Indemnity losses brought to the benefit level of the latest state law;

(c) Medical losses brought to cost level indicated by the average medical manual loss ratio under policies issued in the latest year for which Schedule "Z" is, at the time, available. Because of the rapidly increasing medical cost it was felt that a three year basis for medical would produce too great a lag.

(a) separate factors for industries or groups of industries cannot be determined without the unwarranted exercise of arbitrary judgment, and (b) investigation has demonstrated that the "trend" of the pure premium for the individual class cannot generally be regarded as significant.

It is the aim of the National Council to review, and propose needed changes in, compensation rates in each state annually as of a uniform date selected for that state. This practice is in contrast with the former policy of general (countrywide) revisions at irregular intervals, and is a most important element in the Council's policy. Obviously, in view of changes in statutes and in economic conditions, fairness to both employers and carriers can be maintained only by "keeping everlastingly at it".

APPENDIX

Details of Procedure

To give a better understanding of the methods employed in the review of individual classification experience of a particular state, we are outlining in detail the various steps involved. In order that the outline may take concrete form, we will make the following assumptions*:

(a) The classification experience to be used will be for policy years 1918-1922 inclusive.

(b) The rates will be keyed to the level of the three policy years 1921, 22, 23; 1923 policy year experience being taken from loss ratio data.

The steps in order are as follows:

1. Calculate expected losses for all classes† by applying 1923 revision national pure premiums on basic level to state payrolls, 1918-1922 inclusive.

2. Determine credibility criteria as shown on page 259 paragraph 1 of this paper using local (Schedule "Z" totals are here employed) 1918-22 experience on state present law level. Criteria in terms of expected losses (see preceding paragraph) are obtained by dividing criteria determined on local 1918-22 experience respectively by the following ratios:

(a) Serious

$$= \frac{\text{total local actual losses (present law basis)}}{\text{total expected losses (determined as in par. 1 above)}}$$

(b) Non-serious—analogous to serious

(c) Medical—analogous to serious, except actual is to be on 1922 medical manual loss ratio basis.

3. Allocate (separately for serious, non-serious and medical) classes to credibility groups, and sum expected losses by these three parts, and the five credibility groups.

Notes.—*These assumptions correspond to the situation which confronted the Council, say, in June or July, 1925.

†"All Classes" means all Schedule "Z" classes except Coal Mine, Vessel and other Maritime, Chemical and "a" Rated classes; and except discontinued classes which cannot properly be assigned to any existing class.

4. Convert individual classification experience for each year to state present law and 1922 medical level.

5. Sum actual losses on present law level by three parts and five credibility groups.

6. Before determining "formula pure premiums" (*i. e.*, "weighted" as between local and national in accordance with formulae shown on page 259 paragraph 2 of this paper) it is necessary that not only the indicated pure premiums but also the national pure premiums reflect the state present law level. The basic pure premiums are put on this level by means of "preliminary correction factors" determined separately for serious, non-serious and medical in each case by the below procedure:

Let A = Actual Losses on state present law level
E = Expected Losses (national class pure premiums on basic level $\times$ local payroll)
and C = Preliminary correction factor

$$C = \frac{\Sigma\,(.25\,A_2 + .50\,A_3 + .75\,A_4 + A_5)}{\Sigma\,(.25\,E_2 + .50\,E_3 + .75\,E_4 + E_5)}$$

Subscripts:

(1. Would refer to group with 1.00 local credibility
2. Refers to group with .75 " "
3. " " " " .50 " "
4. " " " " .25 " "
5. " " " " .00 " ")

Proof =

Let A' = Adjusted losses (*i. e.*, expected losses as determined above $\times$ preliminary correction factor).

$$\Sigma A' = \Sigma\,(1.00\,A_1 + .00\,C.E_1 \\ .75\,A_2 + .25\,C.E_2 \\ .50\,A_3 + .50\,C.E_3 \\ .25\,A_4 + .75\,C.E_4 \\ .00\,A_5 + 1.00\,C.E_5$$

$$\text{or } \Sigma A' = \Sigma A - \Sigma\,(.25\,A_2 + .50\,A_3 + .75\,A_4 + A_5) \\ + C\Sigma\ \ (.25\,E_2 + .50\,E_3 + .75\,E_4 + E_5)$$

Substituting for C, we find that $\Sigma A' = \Sigma A$

7. Apply the preliminary correction factors determined as above to the national pure premiums on basic level.

8. Determine formula pure premiums for all classes giving proper weight to local and national experience in accordance with the formula shown in paragraph 2, page 0. (For classes having no local credibility, the formula pure premiums will be obviously the basic pure premiums modified by the preliminary correction factors.)

9. Apply formula pure premium by three parts to 1922 policy year payrolls keeping classes having local credibility separate from classes having no local credibility.

10. Apply present manual rates to 1922 policy year payrolls keeping groups separate as in (9).

11. Determine 1921-2-3 loss ratio based on present manual rates, present law and 1922 medical cost. Compare such loss ratio with permissible and apply indicated increase or decrease to premiums at present manual rates (based on 1922 payrolls as determined in (10) above) to obtain "required premiums".

12. By the use of the following formula determine "final correction factor" which when applied to the formula pure premiums ("serious" and "non-serious" only)† will reproduce the required increase or decrease in rates.

$$\Sigma\,(\text{1922 Payrolls}^{\ddagger} \times \text{Present Manual Rates}) \times \frac{\text{1921-2-3-Loss Ratio}}{\text{Permissible L.R.}}$$

$$= \Sigma\left(\text{1922 Payrolls} \times \left\{\left[\text{Formula Medical P. P.'s} \times \frac{1}{1-E} + \text{Formula Indemnity P. P.'s.} \times \frac{1}{1-E} \times C\right] + .01\right\}\right)$$

NOTE.—†The "final correction" applies to indemnity only, medical having already been keyed to the latest available policy year medical manual loss ratio.

NOTE.—‡In determining the final correction factor and in the "balancing out" process policy year 1922 payrolls are used. Loss ratio data is not reported by classification and accordingly it is impossible to employ the payrolls of the three policy years entering into the rate level calculation. Accordingly the middle year, 1922 in this case, is assumed to represent the average payroll distribution of the three years entering into the rate level calculation. In practice, it is possible in most states to bring in Schedule "Z" on the last year in which case the payrolls of the three rate level years are used instead of the one.

Where C = Final Correction Factor
and E = Expense Loading

13. In order that the "indicated" and "national" as well as the formula pure premiums might be exhibited on the rate level basis the final correction factor (determined as in (12) above) is applied to

(a) Indicated,
(b) National, and
(c) Formula Pure Premiums on present law level

14. Compute present rate pure premiums as equal to the existing manual rate less catastrophe and expense loadings, split in three parts.

15. The form shown herewith (Exhibit B) is used in exhibiting the experience for pure premium selection.

EXHIBIT "A"

NATIONAL COUNCIL ON COMPENSATION INSURANCE

January, 1925 Call for Loss Ratio Experience

_____Company State of_____

Year of Issue		NET PREMIUMS WRITTEN AND LOSSES PAID TO DECEMBER 31st OF					Losses Incurred as of December 31, 1924
		1920	1921	1922	1923	1924	
1920	N. P. Written			XXX	XXX		XXX
	Total Losses			XXX	XXX	XXX	
1921	N. P. Written	XXX			XXX		XXX
	Total Losses	XXX			XXX	XXX	
1922	N. P. Written	XXX	XXX				XXX
	Total Losses	XXX	XXX			XXX	
1923	N. P. Written	XXX	XXX	XXX			XXX
	Total Losses	XXX	XXX	XXX			
1924	N. P. Written	XXX	XXX	XXX	XXX		XXX
	Total Losses	XXX	XXX	XXX	XXX		

KINDLY EXCLUDE COAL MINE DATA

EXHIBIT "B"

NATIONAL COUNCIL ON COMPENSATION INSURANCE

STATE _____
DATE _____
NAT'L REV'N # _____
LOCAL REV'N # _____

Sch. _____ Gr. _____ Code _____ Class _____

POLICY YEAR	PAYROLL	SERIOUS			NON-SERIOUS			MEDICAL	P.P.	TOTAL	P.P.
		No.	AMOUNT	P.P.	No.	AMOUNT	P.P.				
1918											
1919											
1920											
1921											
1922											
Total Pres. Law											
P. P.: Indications on Rate Level											
P. P.: National on Rate Level											
P. P.: Derived by Formula											
P. P.: Underlying Present Rate											
P. P.: Proposed											
P. P.: Adopted											

Sch. _____ Gr. _____ Code _____ Class _____

POLICY YEAR	PAYROLL	SERIOUS			NON-SERIOUS			MEDICAL	P.P.	TOTAL	P.P.
		No.	AMOUNT	P.P.	No.	AMOUNT	P.P.				
1918											
1919											
1920											
1921											
1922											
Total Pres. Law											
P. P.: Indications on Rate Level											
P. P.: National on Rate Level											
P. P.: Derived by Formula											
P. P.: Underlying Present Rate											
P. P.: Proposed											
P. P.: Adopted											