A REALISTIC PLAN FOR DETERMINING COMPENSATION RATE LEVELS

BY

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Inadequacies of Present Methods

For the past twenty years our rate making organizations have been engaged in the work of developing a rational system for the rating of workmen's compensation risks, adequate to cover the continued rise of indemnity and medical benefits and reasonable in its distribution of cost among industrial classifications and individual risks. To what extent have our efforts proven successful? The time is now ripe for self-examination and honest criticism in order to ascertain whether the several parts of our system are well fitted to achieve the desired object, or whether a change in methods may not serve to produce better results. In the course of such examination, it will be essential to review with great care (1) our method for determining general rate levels; (2) our system of classification and the formula for deriving relativity in rates; and (3) our merit rating plans. The classifications in our manual are now undergoing a thorough revision and our formula for determining relativity on the basis of Schedule Z experience has justified itself as dependable by the test of time and experience. For the present at least, and perhaps for a long time to come, it may be dismissed from the realm of discussion as a *fait accompli,* a scheme that has withstood the challenge of criticism. Its use has provoked no protests from policyholders, no dissatisfaction from the agency field and no clamor of objections from underwriters or supervisory authorities. This item in our program may be regarded as fairly permanent.

Insofar as merit rating is concerned, there is considerable agitation at the present time for the discontinuance of schedule rating and for reforming experience rating so as to make it more responsive to public expectations. But speaking in general terms, our merit rating plan has been developed and applied in a consistent and orderly manner under formulae possessing elements of sound logic and the quality of permanency. Desirable reforms in experi-

ence rating will be offered in another paper to be presented by one of my associates.

An extraordinary picture, however, is presented when we come to examine the laboratory methods employed by our technicians in determining the so-called *general rate level.* Every general revision of rates has assumed a disorderly appearance of a bargain-counter with the insurance commissioner behind the counter and the carriers in front, jostling one another for position. In the selection of the rate level the methods varied each time depending on the degree of optimism (or shall we say pessimism) displayed by the actuaries and executives in their outlook on the future. Generally speaking, the formula comprised the following points: (1) Find the experience level for the latest available year, or two years, or three years, as judgment, often resting on compromise of conflicting views, might dictate. (2) Since the latest available experience on a policy year basis may be immature, one must devise ways and means for ascertaining what developed experience would show if it were available. In late revisions this has been accomplished by a study of the relation which cash payments bear to incurred losses over a period of years. (3) The third point in this formula, aside from adjustments due to law amendments, and to deficits resulting from merit rating, is to arrive at a factor that would represent our judgment as to the future effect of industrial conditions on compensation costs. This obviously is the most difficult and the least promising part of the program. It involves elements of projection to reflect the expected rise in medical costs, and emergency factors to meet a variety of adverse conditions including decreased payrolls in periods of depression.

Prompted by an optimism prevalent during the boom period of 1925-1929, a so-called *permanent rating program* was inaugurated, which accepted as a base a revolving three year policy period backed by a theory that the companies were in business to stay *forever and a day,* and that the losses of one year would be offset by the profits of succeeding years. Time has shown this theory to be faulty in several respects:—profits assumed a low visibility, compensation costs showed a constant upward trend and the years of depression have shaken popular faith in the permanency of institutions created and managed by human beings. Aside from that, the formula suffered from the defect common to all

preceding and succeeding devices in that the policy year experience was too ancient to serve as a useful index for the future level. Failure of the formula to produce adequate rates led to frequent changes in the method of determining the hypothetical loss ratios and finally to the abandonment of the entire program when the years of depression brought forth a demand for special measures, including a provision for a so-called *emergency factor*. It may be frankly admitted that our present methods for fixing the general rate level are inconsistent in practice, involve considerable speculation and should be dropped in favor of a plan that could be applied in an orderly manner without involving the rating organization and the carriers in an annual struggle with the public authorities.

Analysis of the Proposed Plan

"Is it possible to make compensation rates adequate as well as reasonable, or are we shooting at a target which is beyond our reach?" This question, put by the Chairman of a Committee appointed by the National Convention of Insurance Commissioners, elicited a reply which in legal circles would be construed as a *plea in confession and avoidance*. In this case it amounted to an avoidance of a direct answer and a confession of inability to bridge the chasm between the experience of the past and the probabilities of the future period for which rates were to be established. After puzzling a great deal over this question, I have come to the conclusion that the helplessness thus confessed could be traced to the fact that in the past we have approached the problem in an academic spirit, laying a great deal of stress on the mathematics of the subject, but ignoring realities and overlooking practices in other fields of insurance.

The plan which is here submitted for your criticism possesses in my humble judgment the essential elements of adequacy, simplicity and consistency, and is founded on the belief (1) that the immediate and distant past experience alone need be taken into account; (2) that speculation on futures is unscientific and valueless; (3) that a comprehensive fixed period of *calendar year* experience brought down to date will provide from year to year an index for rate levels which in the long run should prove adequate and reasonable.

Until the present time we have proceeded on the theory that

the rate level for the coming year must reflect the true condition of that year. Plausible as the theory may sound, its fulfillment in practice was a matter of chance. Not knowing the industrial and economic conditions which may confront us, the actual decision on what foundation the rate level should rest was necessarily speculative in character. And even if we had precise knowledge of industrial or economic conditions confronting us, it would still be necessary to indulge in considerable guesswork in order to measure the effect of such conditions on compensation costs. The effect of some particular factor may be estimated, but general conditions are the result of such a complex combination of many factors that one can only guess qualitatively at the net result insofar as future costs are concerned. I believe that the time has come to discard this theory and to adopt a different philosophy. The element of realism which forms the basis for the proposed plan is closely related to what is known as the *account current* method. In effect the plan contemplates a practical outlook on the workmen's compensation problem as contrasted with the idealistic view of the casualty technicians who have heretofore striven to translate the rate level in terms of future conditions. Frankly we should no longer follow the idea that we must make our rate level to conform with prospective economic conditions. Future conditions are unknown and impossible to appraise. It is much more logical to substitute the principle that our methods should produce rate levels which will be adequate, not for the period of one year, but over a period of many years; adequate in the long run for the business as a whole and for companies sufficiently stable to withstand the shock of exceptional losses in a given year. Coupled with this elementary principle of adequate rates over a period of years, may be introduced the idea that excessive profits will be returned to policyholders in the form of rate level reduction, while excessive losses will be charged to policyholders as a group in the form of rate level increases.

The proposed plan is based on the principle that a long term of unmodified calendar year experience shall serve as an index for the rate level to be revised annually. The experience period may run from five to ten years on the usual revolving basis without adjustment for changes which have been made in the rate levels. Assume that we are about to make rates in New York to become

effective July 1, 1934. For rate level purposes we will discard all previous conceptions respecting policy year experience, and we will take the accumulated experience over ten complete calendar years beginning with January 1, 1924 and ending with December 31, 1933. The loss ratio shown by this ten year experience period will serve as an index for our next rate level. If it is above 60% the current rate level will be increased accordingly. If it is below 60% the current rate level will be decreased accordingly. We shall follow up this method from year to year, deducting one calendar year from the old experience and adding one calendar year of the new experience. This method may be modified so as to reduce the cycle of experience from the ten year period to a lesser period. In either case the result should produce ultimate stable loss ratios within prescribed limits.

It is to be noted that in this plan we have borrowed from the *permanent rating program* the principle that a revolving period of experience shall be used as the index for the rate level and the theory that rates shall be made adequate over a term of years rather than for a particular year. But we have departed by substituting a long term of unmodified calendar years rather than a short term of modified policy years, and have carried the theory of *long term adequacy* to its logical conclusion by the requirement that there shall be consistent adherence to the formula from year to year, so that the surplus indicated by a given period may serve to decrease the proximate rate level and the deficit may be likewise recovered through the consistent application of the plan.

The argument for the proposed plan is outlined in the following analysis:

1. A long term will give flexibility and permanency to the scheme. For example, a ten year cycle in the form of a revolving period will contain within its frame a sufficient volume of favorable and unfavorable conditions to produce a desirable average.* I do not want to convey the impression that a ten year cycle is absolutely essential to the scheme. The period may be shortened, but a longer period has the advantage of being free from violent fluctuations which may otherwise occur from year to year.

* A revolving period follows the principle that all life is in motion and is in agreement with the formula for relativity in classification rates.

2. The selection of the second ten year period of compensation is supported by sound logic. The first ten year period of experience must be regarded as immature and imperfect. During that period the Law was in the process of making, both as to statute and court decisions. The employer, the workman and the insurance carrier were undergoing a process of education in safety work, in claim settlements and in ascertainment of their legal rights and defenses. The Labor Department and its referees were learning their functions as administrators and judicial officers. Moreover the first ten year period includes wartime wages and post-war abnormal conditions in the management of industry. A real stabilization of law and practice may fairly be reckoned as having begun with calendar year 1924, the second ten year period of compensation experience.

3. The substitution of calendar year experience is in itself an important step which should lead towards placing compensation insurance on a business-like foundation. One of the greatest difficulties in rate making has been the task of interpreting past experience in the light of present conditions. If we cling to the policy year period we would have available in New York as a basis for the 1934 rate level, at the very best, a partial picture of policy year 1932, leaving open to speculation the present as well as the future. The cycle of calendar year experience reflects past and current conditions and should produce a rate level which is dependable and sensitive to economic changes. It should operate to restore with reasonable promptness any deficit due to unfavorable developments. With equal promptness it will operate to decrease the rate level because of any excess profits. Supplemented by the corrective functions of experience rating it will serve to mete out equal justice to insurance carrier and to policyholder.

4. The calendar year experience is of special advantage in that it will include within its scope awards on reopened cases not available in the early reports of policy year experience. It may also serve to correct any tendency on the part of companies to underestimate or overestimate reserve values.

5. Objection may be raised to the fact that the calendar year experience will contain immature data in the shape of estimated premiums and losses. It should be borne in mind, however, that the quantum of immature experience diminishes in proportion to

the length of the experience period. The greater the number of calendar years under review, the closer will the data approximate experience on a policy year basis. (See Table F.)

6. I am aware that the idea of making rates on the basis of the exact indications of a fixed period is subject to criticism because it fails to recognize trends in a line of insurance *affected by changing forces that produce unstable probabilities.** This criticism is well merited as respects a formula based on policy periods, but loses much of its force and is relatively unimportant under our proposed theory of rate levels which recognizes the principle of reimbursement in the form of annual readjustments.

The Account Current Method in Operation

The idea for the account current method originated with the late Roy A. Wheeler as an incident to discussions on experience rating. The application of the principle in determining the general rate level is new, however, and represents the fruit of conference with my fellow-members of this Society. This does not mean, however, that I claim title to the authorship of this plan. Whatever its virtues or defects, responsibility for its make-up and the statistical exhibits attaches to the actuarial staff of the Compensation Insurance Rating Board, although I may have been instrumental in furnishing the stimulus for the work. In presenting this paper I am merely serving as an interpreter in the hope that discussion and criticism may eventually result in a practical method for the consistent treatment of rate levels.

The annexed Exhibit, comprising four tables, shows the results of a test based on a ten, eight, seven and five year cycle respectively. This test was made on the assumption that the proposed plan was applied for the first time to policies effective January 1, 1925 and to successive annual rate revisions down to and including 1932.†

As a demonstration of the effectiveness of the proposed plan, I direct attention to the following actual loss ratios for period

* A. H. Mowbray, *Proceedings,* Vol. XVII, Page 87.

† See notes to the Exhibit for a detailed explanation of the tables referred to.

1925-1932 inclusive and to the results that might have been achieved if this new plan had been in operation:

TABLE E

	Loss Ratio	Deficit in Premium†	Gain Over Actual Experience
Actual Experience.	65.4	41,354,745	—
(A) 10 Year Moving Average.	63.8	29,886,999	11,467,746
(B) 8 Year Moving Average.	62.5	19,802,645	21,552,100
(C) 7 Year Moving Average.	61.1	8,841,418	32,513,327
(D) 5 Year Moving Average.	57.7	+20,301,583	61,656,328

† Plus (+) sign denotes gain over the premium necessary to produce a 60% loss ratio.

It will be observed that at the end of 1932 the five year plan shows a gain of over twenty million dollars. This surplus, if it were available for future rate level decreases, could be definitely earmarked as a fund to be held in reserve for the benefit of policyholders.* To carry this idea into effect may require a special compensation schedule in the annual statement to show the status of the account at the end of each year. A summary of the annual statements would then give precise information for the current rate level to the carriers and the Insurance Departments, thus dispensing with the usual debates and interminable wrangling over the subject.

As convincing proof that experience on the basis of calendar years approaches closely to experience of policy years for a long term, I have selected the experience of six representative carriers over an eight year period. A summary of the experience and comparative loss ratios is given below:

TABLE F

Period	Calendar Years		Policy Years		Loss Ratios	
	Premiums Earned	Losses Incurred	Premiums Earned	Losses Incurred	Calendar Year	Policy Year
1925	19,389,154	10,668,016	22,531,430	13,035,927	55.0	57.9
1925-26	42,779,744	25,408,753	45,136,562	26,195,277	59.4	58.0
1925-27	66,568,972	39,372,976	67,340,178	38,793,127	59.1	57.6
1925-28	88,686,090	52,995,845	88,576,569	51,359,780	59.8	58.0
1925-29	109,312,727	65,741,149	107,620,166	63,855,241	60.1	59.3
1925-30	127,996,198	78,269,043	124,245,243	74,697,728	61.1	60.1
1925-31	143,341,315	87,293,458	138,441,504	82,951,769	60.9	59.9
1925-32	156,885,790	94,533,018	145,871,762	87,469,271	60.3	60.0

* The idea of special reserves is also suggested in a recent address by S. Bruce Black before the Chamber of Commerce of the U. S.

Public Reaction

The question will be raised as to whether the plan will prove acceptable to the supervisory authorities and to the general public. It is to be expected that a scheme which does not immediately reduce compensation costs will not meet with general favor. Public acclaim is reserved for the demagogue who obscures or manipulates the principle of taxation so as to produce the desired effect on the minds of the unthinking. I feel, however, that the intelligent public authorities will recognize this plan as an aid in maintaining the solvency of insurance carriers for the protection of the employer, the worker and his dependents. This plan has features which should appeal also to the general public. It possesses the important elements of consistency and simplicity. It is capable of consistent application from year to year without involving us in fruitless speculations as to what the future may develop. Above all the simplicity of the plan makes it an easy matter to explain its workings to the public and to supervisory authorities.

Policy year experience, with its missing links, requires speculative factors to cover present and future expectations. Moreover it makes necessary interpretative factors to translate the experience to current manual rate levels and to collectible rate levels, all of which is unintelligible to the general public. It is full of complications, difficult to explain even to our professional underwriters and insurance executives. How much more difficult, how impossible to explain to the general public not familiar with insurance technique.

The plan under discussion is realistic. It should not be difficult to convince the public that it is founded on *just principles*. Once the public is satisfied that it is our purpose to deal fairly with the policyholder by annually adjusting excess profits due to a high rate level, or excess losses due to a low rate level, it will accord to the casualty companies the same degree of confidence now enjoyed by life insurance companies which have adopted the practice of returning excess gains from mortality and interest to their policyholders in the form of cash dividends and paid-up insurance.

I may offer the suggestion that as a means of winning public favor, our rating authorities should extend to industry an opportunity to learn something of the needs of insurance carriers and

the importance of maintaining an adequate rate level. This could be accomplished in part through discussion and conference with representatives of industrial organizations. Such conferences, held prior to any action on radical rate changes, may relieve the insurance commissioner from the burden of public hearings where the carriers often split in two or more factions and the policyholders appear in opposition to a program which they do not fully understand. By taking the public into our confidence we have nothing to lose and everything to gain.

Other Reforms to Follow an Adequate Rate Level

Edgar Allen Poe in his classic story of "The Purloined Letter" shows how it is possible for a resourceful expert agent of the French *Sûreté* to overlook the most likely hiding place when searching for a stolen document. Have we not also made the error of ignoring the obvious in our efforts to find the true rate level? We have searched every nook and corner of our structure while the thing was staring us in the face, visible to every passerby in the form of sworn published statements and statistical tables on exhibit in the Insurance Department.

It is idle to believe that we can make rate levels that will accurately approximate the future. To a certain extent we are in the same position as the visitor to an art gallery who is inspecting a painting at close range and cannot get real appreciation of its value or beauty. The biographer or historian must view his material in perspective; it is only after the passage of a number of years that he can do full justice to his subject. Are we not in a similar situation, possessing only an imperfect knowledge of the present and a total ignorance of the future? With a target that is too close or receding we are apt to shoot the innocent bystander. It is now time to admit our shortcomings and take up a new course, untried but showing much promise.

We have a wealth of statistical material in our hands. It is a question of using that material in the proper way. I have no intention to criticise the methods used heretofore, nor to reproach the actuarial profession for its praiseworthy efforts to attain the ideal. But if in this search for the ideal it is possible to employ realistic methods, the science of rate making may be simplified and made intelligible to the general public.

Moreover, an adequate rate level may lead to other desirable reforms in compensation insurance. I agree with Mr. Kulp that *rate making is the central and vital feature of any system of true insurance* (*Proceedings,* Vol. XIX, Page 268), and with Mr. Greene that *it is desirable to eliminate rate level controversies from the compensation business* (*Proceedings,* Vol. XIX, Page 243). With an adequate rate level in effect it should no longer be necessary for casualty executives to restrict compensation writings on the basis of a percentage figure related to other casualty lines. This restricted method of underwriting is in itself an expedient thoroughly unscientific in form and arbitrary in practice. If individual carriers are to follow the practice of restricting workmen's compensation writings, the restriction should be based upon quality of the offering rather than on its quantity relation. It is folly to assume that a 15% limitation of writings comprising poor risks is of greater help to the company than a selective, qualitative underwriting comprising in the aggregate a figure which amounts to 50% of the company's total casualty premiums. Once the question of rate level is definitely settled, other pressing problems such as imperfect payroll audits and undue extension of credit will then receive detailed attention on the part of insurance carriers and rating authorities.

* * * * *

At the risk of repetition and for the sake of emphasis, the principal points of the proposed plan are briefly summarized as follows:

The selection of calendar year experience over a long term of years rests on the principle that such experience will represent a variety of conditions and in its sum total will be akin to the results shown by policy year experience. The consistency of the scheme is assured by the use of a revolving period which is based on the broad fundamental that the industrial world is not at rest but is in constant motion, which principle is also part of our formula designed to produce proper relativity in classification rates. And finally, the annual readjustment of the rate level involving a form of reimbursement for the mutual advantage of carriers and the public should satisfy our sense of justice and remove the entire subject from the field of abstract speculations

and futile prophecies. This principle of reimbursement should provide a stimulus for creating special reserve funds so that the surplus gained in years of prosperity will be used to assure the solvency of the carriers and provide means for maintaining a proper rate level in succeeding years of adversity without hoisting signals of distress in a plea for emergency legislation.

In offering this plan as a practical answer to a difficult question, I have refrained from involving the subject in a maze of confusing technicalities so that the ensuing discussion may be simple, direct and free from mathematical subtleties. I hope I have succeeded in this endeavor. I have a strong feeling that the theory underlying the plan is sound, even though its presentation in this popular form may seem inadequate to my fellow-members in this Society.

TEN YEAR MOVING AVERAGE PROCESS EFFECTIVE BEGINNING WITH POLICY YEAR 1925

(1) Calendar Year	(2) Actual Earned Premiums (S.F. Adjusted)	(3) Adjust. Factor*	(4) Adjusted Premium (2) x (3)	(5) New Method Factor**	(6) New Method Premium (4) x (5)	(7) Actual Losses Incurred	Loss Ratios (8) Actual (7) ÷ (2)	Loss Ratios (9) New Meth. (7) ÷ (6)	(10) Rate Lev. Change (9) ÷ .60	(11) Rate Lev. & Law Am. ≠ (10) x L.A.
1914–23	283,551,478	1.000	283,551,478	1.000	283,551,478	167,172,732	59.0	59.0	.983	1.039
1914–24	329,888,313	1.000	329,888,313	1.000	329,888,313	202,561,005	61.4	61.4	1.023	1.063
1925	52,709,364	.966	50,917,246	1.020	51,935,591	33,692,444	63.9	64.9	—	—
1914–25	382,597,677	—	380,805,559	—	381,823,904	236,253,449	61.7	61.9	1.032	1.097
1926	63,724,387	.887	56,523,531	1.052	59,462,755	38,388,010	60.2	64.6	—	—
1914–26	446,322,064	—	437,329,090	—	441,286,659	274,641,459	61.5	62.2	1.037	1.172
1927	57,315,033	.849	48,660,463	1.080	52,553,300	34,717,128	60.6	66.1	—	—
1918–27	445,916,480	—	437,261,910	—	436,119,342	272,907,588	61.2	62.6	1.043	1.222
1928	64,959,978	.861	55,930,541	1.137	63,593,025	41,126,914	63.3	64.7	—	—
1919–28	481,009,840	—	463,325,833	—	469,845,749	299,569,946	62.3	63.8	1.063	1.299
1929	65,041,020	.895	58,211,713	1.197	69,679,420	45,323,664	69.7	65.0	—	—
1920–29	510,471,101	—	485,957,787	—	503,945,410	321,419,310	63.0	63.8	1.063	1.381
1930	58,009,557	.903	52,382,630	1.271	66,578,323	40,422,581	69.7	60.7	—	—
1921–30	525,268,291	—	495,128,050	—	527,311,366	337,377,941	64.2	64.0	1.067	1.474
1931	54,229,617	.841	45,607,108	1.340	61,113,525	38,613,261	71.2	63.2	—	—
1922–31	539,970,808	—	501,208,058	—	548,897,791	357,071,419	66.1	65.1	1.085	1.599
1932	45,951,729	.739	33,958,328	1.428	48,492,492	29,693,256	64.6	61.2	—	—
1923–32	550,829,004	—	500,072,853	—	562,296,750	366,838,776	66.6	65.2	1.087	1.738
1914–32	791,828,998	—	732,079,873	—	803,296,744	504,538,263	63.7	62.8	—	—

TEST OF LONG TERM RATE LEVEL DETERMINATION — Exhibit—Table B

EIGHT YEAR MOVING AVERAGE PROCESS EFFECTIVE BEGINNING WITH POLICY YEAR 1925

(1) Calendar Year	(2) Actual Earned Premiums (S.F. Adjusted)	(3) Adjust. Factor*	(4) Adjusted Premium (2) x (3)	(5) New Method Factor**	(6) New Method Premium (4) x (5)	(7) Actual Losses Incurred	Loss Ratios (8) Actual (7) ÷ (2)	Loss Ratios (9) New Meth. (7) ÷ (6)	(10) Rate Lev. Change (9) ÷ .60	(11) Rate Lev. & Law Am. ‡ (10) x L.A.
1914–23	283,551,478	1.000	283,551,478	1.000	283,551,478	167,172,732	59.0	59.0	.983	1.039
1914–24	329,888,313	1.000	329,888,313	1.000	329,888,313	202,561,005	61.4	61.4	1.023	1.063
1925	52,709,364	.966	50,917,246	1.020	51,935,591	33,692,444	63.9	64.9	—	—
1918–25	324,877,060	—	323,084,942	—	324,103,287	199,622,450	61.4	61.6	1.027	1.092
1926	63,724,387	.887	56,523,531	1.052	59,462,755	38,388,010	60.2	64.6	—	—
1919–26	358,734,829	—	349,741,855	—	353,699,424	223,725,904	62.4	63.3	1.055	1.187
1927	57,315,033	.849	48,660,463	1.078	52,455,979	34,717,128	60.6	66.2	—	—
1920–27	380,470,103	—	362,822,559	—	370,575,644	234,968,732	61.8	63.4	1.057	1.255
1928	64,959,978	.861	55,930,541	1.140	63,760,817	41,126,914	63.3	64.5	—	—
1921–28	402,217,714	—	375,540,733	—	391,124,094	251,631,696	62.6	64.3	1.072	1.345
1929	65,041,020	.895	58,211,713	1.221	71,076,502	45,323,664	69.7	63.8	—	—
1922–29	427,731,634	—	394,225,346	—	422,673,496	278,035,577	65.0	65.8	1.097	1.475
1930	58,009,557	.903	52,382,630	1.300	68,097,419	40,422,581	69.7	59.4	—	—
1923–30	450,647,658	—	411,514,443	—	455,677,382	298,532,259	66.2	65.5	1.092	1.611
1931	54,229,617	.841	45,607,108	1.410	64,306,022	38,613,261	71.2	60.0	—	—
1924–31	462,325,791	—	414,570,067	—	477,431,920	307,672,275	66.5	64.4	1.073	1.729
1932	45,951,729	.739	33,958,328	1.543	52,397,700	29,693,256	64.6	56.7	—	—
1925–32	461,940,685	—	402,191,560	—	483,492,785	301,977,258	65.4	62.5	1.042	1.802
1914–32	791,828,998	—	732,079,873	—	813,381,098	504,538,263	63.7	62.0	—	—

SEVEN YEAR MOVING AVERAGE PROCESS EFFECTIVE BEGINNING WITH POLICY YEAR 1925

(1) Calendar Year	(2) Actual Earned Premiums (S.F. Adjusted)	(3) Adjust. Factor*	(4) Adjusted Premium (2) x (3)	(5) New Method Factor**	(6) New Method Premium (4) x (5)	(7) Actual Losses Incurred	Loss Ratios (8) Actual (7) ÷ (2)	Loss Ratios (9) New Meth. (7) ÷ (6)	(10) Rate Lev. Change (9) ÷ .60	(11) Rate Lev. & Law Am. ‡ (10) x L.A.
1914–23	283,551,478	1.000	283,551,478	1.000	283,551,478	167,172,732	59.0	59.0	.983	1.039
1918–24	272,167,696	1.000	272,167,696	1.000	272,167,696	165,930,006	61.0	61.0	1.017	1.057
1925	52,709,364	.966	50,917,246	1.020	51,935,591	33,692,444	63.9	64.9	—	—
1919–25	295,010,442	—	293,218,324	—	294,236,669	185,337,894	62.8	63.0	1.050	1.110
1926	63,724,387	.887	56,523,531	1.048	59,236,660	38,388,010	60.2	64.8	—	—
1920–26	323,155,070	—	314,162,096	—	317,893,570	200,251,604	62.0	63.0	1.050	1.200
1927	57,315,033	.849	48,660,463	1.084	52,747,942	34,717,128	60.6	65.8	—	—
1921–27	337,257,736	—	319,610,192	—	327,429,145	210,504,782	62.4	64.3	1.072	1.286
1928	64,959,978	.861	55,930,541	1.155	64,599,775	41,126,914	63.3	63.7	—	—
1922–28	362,690,614	—	336,013,633	—	352,501,820	232,711,913	64.2	66.0	1.100	1.415
1929	65,041,020	.895	58,211,713	1.243	72,357,159	45,323,664	69.7	62.6	—	—
1923–29	392,638,101	—	359,131,813	—	389,765,446	258,109,678	65.7	66.2	1.103	1.561
1930	58,009,557	.903	52,382,630	1.351	70,768,933	40,422,581	69.7	57.1	—	—
1924–30	408,096,174	—	368,962,959	—	417,982,895	269,059,014	65.9	64.4	1.073	1.675
1931	54,229,617	.841	45,607,108	1.488	67,863,377	38,613,261	71.2	56.9	—	—
1925–31	415,988,956	—	368,233,232	—	439,509,437	272,284,002	65.5	62.0	1.033	1.730
1932	45,951,729	.739	33,958,328	1.618	54,944,575	29,693,256	64.6	54.0	—	—
1926–32	409,231,321	—	349,482,196	—	442,518,421	268,284,814	65.6	60.6	1.010	1.747
1925–32	461,940,685	—	402,191,560	—	494,454,012	301,977,258	65.4	61.1	—	—
1914–32	791,828,998	—	732,079,873	—	823,342,325	504,538,263	63.7	61.3	—	—

TEST OF LONG TERM RATE LEVEL DETERMINATION

Exhibit—Table D

FIVE YEAR MOVING AVERAGE PROCESS EFFECTIVE BEGINNING WITH POLICY YEAR 1925

(1) Calendar Year	(2) Actual Earned Premiums (S.F. Adjusted)	(3) Adjust. Factor*	(4) Adjusted Premium (2) x (3)	(5) New Method Factor**	(6) New Method Premium (4) x (5)	(7) Actual Losses Incurred	Loss Ratios (8) Actual (7) ÷ (2)	Loss Ratios (9) New Meth. (7) ÷ (6)	(10) Rate Lev. Change (9) ÷ .60	(11) Rate Lev. & Law Am. # (10) x L.A.
1914–18	87,587,235	1.000	87,587,235	1.000	87,587,235	50,915,555	58.1	58.1	—	—
1919–23	195,964,243	1.000	195,964,243	1.000	195,964,243	116,257,177	59.3	59.3	.988	1.044
1920–24	206,721,319	1.000	206,721,319	1.000	206,721,319	128,171,150	62.0	62.0	1.033	1.078
1925	52,709,364	.966	50,917,246	1.022	52,037,425	33,692,444	63.9	64.7	—	—
1921–25	216,218,316	—	214,426,198	—	215,546,377	137,399,644	63.5	63.7	1.062	1.145
1926	63,724,387	.887	56,523,531	1.061	59,971,466	38,388,010	60.2	64.0	—	—
1922–26	240,415,603	—	231,422,629	—	235,990,743	156,867,781	65.2	66.5	1.108	1.307
1927	57,315,033	.849	48,660,463	1.112	54,110,435	34,717,128	60.6	64.2	—	—
1923–27	262,637,103	—	244,989,559	—	255,007,645	171,659,100	65.4	67.3	1.122	1.466
1928	64,959,978	.861	55,930,541	1.226	68,570,843	41,126,914	63.3	60.0	—	—
1924–28	285,045,597	—	258,538,616	—	281,027,004	183,312,769	64.3	65.2	1.087	1.594
1929	65,041,020	.895	58,211,713	1.387	80,739,646	45,323,664	69.7	56.1	—	—
1925–29	303,749,782	—	270,243,494	—	315,429,815	193,248,160	63.6	61.3	1.022	1.629
1930	58,009,557	.903	52,382,630	1.530	80,145,424	40,422,581	69.7	50.4	—	—
1926–30	309,049,975	—	271,708,878	—	343,537,814	199,978,297	64.7	58.2	.970	1.580
1931	54,229,617	.841	45,607,108	1.612	73,518,658	38,613,261	71.2	52.5	—	—
1927–31	299,555,205	—	260,792,655	—	357,085,006	200,203,548	66.8	56.1	.935	1.477
1932	45,951,729	.739	33,958,328	1.605	54,503,116	29,693,256	64.6	54.5	—	—
1928–32	288,191,901	—	256,090,431	—	357,477,687	195,179,676	67.7	54.6	.910	1.344
1914–32	791,828,998	—	732,079,873	—	853,485,326	504,538,263	63.7	59.1	—	—

EXPLANATORY NOTES FOR TABLES A, B, C AND D

* Column (3)—Adjustment to the level of rates effective prior to January 1, 1925. (Weighted Average of calendar year transactions for two consecutive policy years.)

** Column (5)—Arithmetical average of rate level increases for two consecutive policy years (based on column 11).

Column (11)—The figures in this column are cumulative; they also include a law amendment factor of 1.057 beginning with policy year 1925 (see line 1914-1923) and 1.030 beginning with policy year 1928 (see line 1914-1926).

Since calendar year 1923 experience was the latest available during 1924, the period 1914-1923 was taken as the basis for fixing the 1925 rate level. The experience for such period indicates in column (10) a reduction of 1.7%, which reduction, however, is offset by a law amendment factor of 1.057, thus producing a rate level increase of 1.039 for 1925 as shown in column (11).

The rate level for 1926 is determined by the experience of 1915-1924. However, separate experience for calendar year 1914 was not available so that in the test the experience of eleven years (1914-1924) was used. The loss ratio for this period is shown in column (9) as 61.4% indicating a rate level increase of 1.023 which, combined with the previous increase of 1.039, produces for policy year 1926 a rate level 6.3% higher than for policy year 1924. The same procedure is then applied for each of the successive policy years. Thus the rate level increase for policy year 1927 is determined on basis of 1914-1925 (the correct method would be to use 1916-1925, but neither 1914 nor 1915 calendar years are available separately so that a twelve year period is used). Policy year 1928 is based on calendar years 1914-1926 (the use of a thirteen year period is explained in the same manner as above). The rate level for policy year 1929 is based on calendar years 1918-1927 and for each successive policy year the calculations are based on a ten year period.

The process involves two steps, first, the translation of actual earned premiums to the level of rates effective in 1924 and, second, the calculation of the premium that would have been obtained had the new method been adopted as far back as to be effective on January 1, 1925. The adjustment factor in column (3) represents the reduction necessary to bring the premiums in the given calendar year to the level of rates effective in 1924.

The factor in column (5) was calculated as follows: To the cumulative rate level change as indicated in column (11) for policy year corresponding to calendar year (three lines above the given year), add the preceding rate level change in column (11) and divide the result by two (2). Thus, for example, the rate level change for policy year 1929 calculated on the basis of policy years 1918-1927 is shown in column (11) to be 1.222. The preceding rate level change is given as 1.172, hence the arithmetical average of 1.197 used for calendar year 1929. This was done on the theory that the transactions of a calendar year are equally divided as to premiums for the policy year corresponding to the calendar year and the preceding policy year.