A STATISTICAL ANALYSIS OF THE BENEFIT PROVISIONS OF THE COMPENSATION ACTS

BY

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PART I

At the present time in the United States, legislation providing compensation benefits for industrial injury or death exists in all but three states.* Introduced at first in a few states and with modest benefits, workmen's compensation has developed both in its coverage and benefit provisions, until it covers practically all employees, and provides benefits which are often many times greater than those allowed in the early laws. While this particular system of social insurance has thus developed, it has not been accompanied in its development by any other similar systems, although the air is rife with discussions of, and proposals for, various social security programs, to provide against the other vicissitudes of life, which may eventually be incorporated in the social framework.

With the introduction of plans for widespread systems for old age, unemployment and health insurance, it may be that the field of workmen's compensation may lose some of its preeminence; but while it still holds the unique position of the only major system of social insurance which has become an accomplished fact, it is of interest to note the extent to which it provides benefits to the victims of industrial accidents.

Two general lines of investigation will be pursued: in one an attempt will be made to evaluate the average benefits provided by statutes now in effect, and in the other, to analyze the available statistical data in order to determine the actual average amounts paid as benefits over as long a period of time as is feasible. In interpreting the extent to which the compensation principle has been carried, this paper will not concern itself with an analysis of the scope of coverage extended by the compensation acts, but will be confined to an analysis of the benefit provisions.

* Arkansas, Mississippi and South Carolina. A newly enacted Florida law becomes effective July 1.

The three parts of the paper will deal with the basis of determining the relative liberality of the benefit provisions, the method of determining the cost by theoretical estimates, and a comparison of actual results with theoretical estimates.

Preliminary Considerations

To the individual or his family, the immediate economic loss occasioned by an industrial injury is the loss of wage. On the theory that a substitute income must be provided as soon as is reasonably possible, and on the assumption that the employee's wage scale is both the best approximation and the most easily ascertainable measure of his loss, the individual's earnings are used as the basis of compensation payments in practically every state.* The amount of compensation received weekly is usually expressed as a percentage of the average weekly wage, subject to certain minimum and maximum amounts. The compensation laws of the states differ not a little with regard to the amount of this percentage, as well as with regard to the minimum and maximum amounts, the method of computing the average weekly wage, and the benefits provided according to types of injury. The total monetary amounts to be awarded and the duration of time for which the payments shall run are determined separately, and these vary from payments of relatively short durations to payments during continuation of life and from monetary amounts relatively low to amounts relatively high; but apart from these variations, the first point of differentiation in individual benefits is based upon the difference in the wages earned by the individuals injured.

In a sense, and wholly aside from the practical considerations involved, there is an element of justice in determining compensation benefits on the basis of the average weekly wage of the employee. In the majority of cases, and under ordinary conditions, it is reasonable to assume that the expenditures of the employee or his family are determined by his average weekly earnings, and that therefore the minimum disturbance of status is effected by continuing the family income on the basis of a percentage of his actual earnings. The ideal situation, from the

* Exceptions: Washington and Wyoming and some types of benefits in Oregon, Massachusetts and West Virginia.

viewpoint of the injured employee, would be the continuation of his full earnings. Because of fear that in some instances this might be an incentive to malingering, and also possibly with the thought that the employee should in some measure share the economic loss, such a procedure is generally considered impracticable, and the weekly compensation is usually less than the average earnings. Exceptions are commonly made when the income is very low, and the compensation benefits may then be the full wage, or even an arbitrary minimum higher than the wage.

Although practically every state provides that weekly compensation payments shall be based upon average weekly wages, there the similarity ceases. Great variations exist in the methods of determining compensation benefits as well as in the durations and amounts which each act specifies for the employees coming within its jurisdiction. In some instances the benefit provisions may have been influenced by local considerations, in others by historical development, and in some cases perhaps by chance. Whatever the reason, the fact remains that benefits vary widely, and in the majority of states, and with few exceptions, perhaps because the benefit provisions have on the whole not been determined in a manner which will automatically adapt them to changing social and economic conditions, constant attempts are made to modify the existing benefit scales.

During the past year an unprecedentedly large number of proposals seeking to amend the provisions of the compensation acts has been introduced in the various state legislative bodies. This legislative activity may be due to a number of causes. Primarily, the changing economic structure and the prevailing trend of thought toward social legislation has led to an interest in and a review of the only major system of social insurance which is in force in this country. Then, too, there has been in the past a more or less normal tendency to amend the provisions of the compensation acts each year, and to liberalize the benefits. In the last few years, possibly because of the fear of adding to the cost of industrial activity by increasing the benefits and because the legislatures have been busy with more pressing matters, this normal tendency has been nearly at a standstill. Consequently, the number of pending proposals to change the com-

pensation acts has shown a cumulative increase. Although few may be enacted this year, in years to come these measures and many more will be introduced, and eventually many changes may be expected. It is to be hoped that these changes will not continue to be made illogically, motivated simply by the desire for liberalization as so often has been the case in the past, but that consideration will be given to existing benefits and to present and future needs.

Regardless of the channels into which legislative activity may be directed in the future, and wholly aside from any desire to limit changes to those phases most in need of revision, it is of interest to determine, if possible, what the acts allow in their present benefit provisions; and it is of further interest to compare, as closely as is possible, the benefit provisions of each state with those of the others. Due to the rather complex relationship of the various benefit provisions, it is not sufficient merely to compare the phraseology of one law with that of another. It cannot be determined, merely by examination of statutory provisions, whether in the aggregate a provision granting two-thirds of the weekly wage subject to a $15 maximum is more or less liberal than a benefit provision of one-half of the weekly wage, but with a $20 weekly maximum. Similarly it is difficult to tell whether 30% paid to the widow with 10% additional for each dependent child provides more than does a flat 50% in all cases, regardless of the number of dependents. Each law must be analyzed separately and the benefit provisions translated into terms of some common unit, which will show, in the aggregate, the proper relationship of the benefit scales.

It would seem to be a fairly simple and acceptable procedure to compare the average amounts paid for injuries in one state with those in another, and to assume that the difference measures the difference in the benefits provided. Apart from other considerations, such a procedure is impracticable simply for the reason that the requisite statistical data to determine such averages for all states and types of injury are not available; and in many of the instances where they are, the statistical data, because of the small number of cases involved, are not sufficient to be indicative. Another objection lies in the fact that two states may have identical benefit provisions, but because of different administrative

policies or industrial conditions, the actual benefits received by the employees differ. Some other procedure must then be utilized in order to compare the relative liberality of the benefit provisions.

The method most frequently used to determine relative values as between law and law proceeds on the basis of monetary amounts. The state providing the most costly benefits is, so far as benefits are concerned, the one which has the most liberal law. There are, however, certain elements which necessitate a modification of this view when applied to compensation benefits for industrial injury. The benefit is a substitute for future earnings; hence, both the duration of time for which the benefits continue and the monetary amount of the benefits are important and must be considered simultaneously. It is not sufficient to argue that the total monetary amount takes into consideration both the periodic payments and the duration. There is such a wide divergence in the weekly wages paid in the various sections of the country, that benefits which seem liberal for one wage scale may not seem so for another. To illustrate, an employee receiving benefits in a state where a low wage scale prevails and earning $15 weekly may receive weekly compensation of $10 for a period of ten years. In a state where higher wages prevail, an employee earning $30 weekly may receive benefits of $20 for a period of six years. The total payments in the first case amount to but $5,200, whereas, in the second case there is the greater total of $6,240. On a present capitalized value basis, considering discount for interest and mortality, the difference is even more appreciable. Yet in the first instance the injured employee receives two-thirds of his wages for ten years and in the second for only six years. On the earlier assumption that the compensation is a substitute for the loss of future earnings of the individual, then the benefits in the first instance are more liberal, even though the total monetary amount is less. It is, therefore, this wide variation in average weekly wages coupled with the assumption as to the purpose of the benefits that tends to vitiate a comparison of the relative liberality of benefit provisions, if the comparison is made solely on the basis of monetary cost.

The extent to which the compensation act achieves the purpose of providing an indemnity commensurate with the actual loss of

future earnings, rather than the mere monetary cost, should be the true measure of the liberality of the compensation act. If one state provides compensation for a period of ten years and another for six years, all other things being equal, the first state is the more liberal in its benefits, even though because of wage scale differences, the monetary amounts in the second are greater.

Under the theory that an accident causes a wage loss, and that compensation is a reimbursement for this loss, it becomes apparent that it is the more logical method to compute relative liberality in units of duration of payment rather than of monetary amounts; and any attempt to amend benefits so as to equal the cost of similar benefits in another state, without using duration also as a measure of the existing difference, must automatically imply an attempt to equalize wage conditions as well.

For this reason, it is not sufficient to express the benefits provided by the several laws in units of monetary amounts if the results are to be truly indicative. It is necessary to go a step further and determine benefits in units of weeks of wages. This additional step is simple to take. If the average monetary cost is first determined and then divided by the average weekly wage, the result is a duration of payments expressed in units of weeks of wages.

The Table of Relative Costs and Equivalent Durations

Table 1, hereto annexed, shows both the monetary amounts, computed on the basis of the benefits provided by law, and the equivalent durations expressed in units of average weekly wages. These average monetary amounts are based upon calculations using the average weekly wages, and a standard accident table* containing the relative frequency of various types of injuries, as well as the kinship and number of dependents. In addition to the accident table a standard wage distribution† has also been utilized.

The variations in monetary amounts indicate both the difference due to benefit provisions and that due to wage scales. The

* The American Accident Table. Olive E. Outwater, *Proceedings*, Volume VII.

† Legal Limits of Weekly Compensation in Their Bearing on Rate making for Workmen's Compensation Insurance. A. H. Mowbray, *Proceedings*, Volume IX.

durations are the criteria for measuring the actual extent to which the benefits provide a substitute for the loss of wage income.

In many of the states the average weekly wage used as a basis for the calculation of the aggregate cost of the benefits is of great importance, in others it is of less significance. Although in general the average cost of a case will increase if the average wage increases, the durations may not be similarly affected. In case of laws which provide benefits not influenced by the wage scale or which have low monetary maxima, an appreciable increase in the wage scale may only slightly affect the average cost and may decrease the durations considerably. It is therefore always necessary to bear in mind, when using the table, all three elements, the average weekly wage, the average monetary cost and the average duration.

Table 2, hereto annexed, illustrates the effect of the average wage scale. It exhibits the identical data, average cost and average duration, upon the basis of an average weekly wage of $28.37 for each state. This wage is higher than the wage used in any of the states in Table 1. The two tables therefore illustrate both the general effect of a decrease in wages upon the average cost and duration, and the difference ensuing when a single wage is used for all states. It is of interest to note that although the average costs, in general, drop with a lowering of the wage scale, the decrease in wages is relatively much greater than the decrease in costs; and that durations, expressed in units of the lower wage, increase. In view of the fact that the fall in wages since 1929 has been great, this would seem to indicate, that despite the drop in average costs, and despite the partial cessation of legislative activity, the benefits, expressed in units of durations, have been increasing. The benefit provisions of a compensation act, when limited by maxima and minima to weekly compensation, and to total monetary amounts and durations, may provide a more adequate substitute for actual loss of income on a low wage scale than on a high. In general they do so.

The table of relative costs and equivalent durations, inasmuch as it was calculated upon theoretical estimates, is correct in a general way only and is further subject to discount for a number of reasons. Because of the great amount of labor and time in-

volved in obtaining the figures, many approximations were used. The average weekly wages used in the calculations may or may not be indicative of current conditions. It is hoped that they are at least approximately correct. The figures furthermore do not disclose the important difference attributable to the method used in determining the average weekly wage. A law which specifies that the average weekly wage shall be six times the daily wage, provides a greater basis for compensation, in the instance where actually the individual works only 3 or 4 days a week, than does a law which specifies that the actual average weekly wages received shall be used.

The durations are of course not merely the averages of the durations specified in the laws, but are the net result of the effect of mortality, of discount for interest, where these are important, of monetary limits, and of the other elements to which it is possible to give consideration in arriving at a theoretical average cost. While values are shown for fatal, permanent total disability, major permanent partial, minor permanent partial, temporary total, and all of these benefits combined, the latter two are perhaps least indicative. This is because the American Accident Table includes in its distribution all cases of temporary total disability, both compensable and non-compensable. Of the total 100,000 accidents in the distribution, 95,388 are temporary total cases, where the disability lasts for a period of one day or more. Most of the states provide for waiting periods during which time no compensation is payable. Consequently many cases never receive compensation and the use of the full 95,388 cases tends to decrease the averages to unusually low figures. Actually the amounts paid in compensable temporary total cases, are very much greater. Similarly the use of the full number of cases tends to show an unusually low average for all benefits combined. A somewhat analogous situation occurs in the fatal group. Of the total of 762 cases included, 174 are cases with no dependents, which in most states receive only funeral benefits.

There are certain inferences, very natural to make, which none the less should not be made from this table. The fact that differences are indicated on the basis of an estimate of the statutory benefit provisions does not imply that such differences will actually be realized. No such conclusion is warranted. Actual results

will take into consideration such factors as administrative policy, differences in predominating industries, typical injuries, character and dependency conditions of the industrial population and many other elements which not only are not reflected in these tables, but have, in fact, been deliberately excluded in order to emphasize the differences in statutory benefit provisions. It is true that a change in the benefit provisions will affect the average cost of the provisions, but it does not necessarily follow that by changing the benefit provisions to agree with those of any other state the same actual cost will be realized. This can only be possible if the two states, in addition to possessing identical benefit provisions, have the same administrative policies, wage scales, types of industry and industrial population, and any other conditions which have effect upon actual cost.

One important group of benefits for which no values are shown is that of medical benefits. This is due to the fact that the American Accident Table, which is used as the standard distribution, does not contain a subdivision for medical benefits, and to the further fact that the liberality of the medical allowances is largely dependent upon the prevailing medical and surgical fees and hospital charges of the particular state. Those states which provide for unlimited medical treatment both in amount and duration are, subject to the limitation of the service available, on a par; but it is difficult to determine whether a given sum of money will purchase the same degree of medical treatment in one state that it will in another. It is even doubtful whether the same treatment can be purchased in different localities of the same state for the same fee. Instead, therefore, of including values for the medical provisions with the other types of benefits, the actual medical provisions, which can be easily summarized, are shown separately in Table 5.

In addition to the two tables depicting the theoretical estimates of the benefits provided by the compensation acts and the summary of the medical provisions, a statistical analysis of the actual average incurred cost of fatal, permanent total disability, and major permanent partial disability cases as well as the average of these three is presented in Table 4. These data cover a period of 15 years and are based upon statistical reports compiled in most of the years, for about 36 states for which data were

available. It was not possible to prepare a similar exhibit for the minor permanent partial and temporary total cases, but the fatal, permanent total and major cases are the serious ones, and it may safely be said the types of cases wherein the benefits are of utmost importance. The summaries are presented on Graph I and separately, on Graph II are shown, on a somewhat enlarged scale, the data for both the average cost for all injuries combined and for the changes in average weekly wages. As was to be expected, with a fall in the average weekly wages, the average costs decreased, but not nearly to as great an extent as that indicated by the actual decrease in wages.

An illustration of the effect of average weekly wages upon the average estimated amount of benefits and equivalent durations is shown in Table 3 comparing the average costs and durations, for countrywide figures, on the two wage bases used in determining the tables of relative costs and equivalent durations. This indicates very clearly that the costs are not decreased in the same proportion as the wages, and that on a lower wage scale the average equivalent durations are much greater, and provide a relatively greater measure of compensation for the loss of income.

NOTE. Possibly not an integral part of the subject under consideration, but nevertheless of some interest, is the table shown below, compiled from the report* of the New York Insurance Department, giving the number of policies and amount of insurance in force for all life insurance companies. The average amount of insurance in force on a policy has been computed for industrial policies, all ordinary policies, and the aggregate of the two. These figures may be compared to the average amounts provided by the compensation acts. There are of course cases where an individual has more than one policy, but when it is considered that life insurance is also in many cases a form of saving and many policies for large amounts are included, it would seem to indicate that the compensation benefits are on the whole greater than the average amount of insurance in force on a policy. In case of an industrial fatality, the family of the employee, will on the average, using countrywide figures, either actual or theoretical, have an income provided by law, greater than that of the average life insurance policy.

	Number of Policies	Amount of Insurance in Force	Average per Policy (Approximate)
Industrial Business.	74,526,630	$15,625,205,644	$200
All Other.....	25,807,192	74,716,119,318	2,900
Aggregate	100,333,822	90,341,324,962	900

* New York Insurance Report 1932, Part II, Life-Table VIII, all states, for companies reporting data as of December 31, 1931.

TABLE 1

Relative Costs and Equivalent Durations

Estimated average cost per case, based on the indicated average weekly wage, and equivalent duration of payments, expressed in numbers of weeks at the full average weekly wage, calculations made using the American Accident Table and the Benefit Provisions of the Compensation Acts effective May 1, 1935. These values are based solely on theoretical estimates.

State	Average Weekly Wage	TYPE OF BENEFIT											
		Fatal		Permanent Total Disability		Major Permanent Partial Disability		Minor Permanent Partial Disability		Temporary Total Disability†		All Types of Disability†	
		Average Cost Per Case	Equivalent Duration In Weeks	Average Cost Per Case	Equivalent Duration In Weeks	Average Cost Per Case	Equivalent Duration In Weeks	Average Cost Per Case	Equivalent Duration In Weeks	Average Cost Per Case	Equivalent Duration In Weeks	Average Cost Per Case	Equivalent Duration In Weeks
Ala.	$15.39	$1,416	92	$2,842	185	$968	63	$301	20	$13.21	0.9	$43	2.8
Ariz.	23.13	5,801	251	12,790	553	2,254	97	597	26	34.95	1.5	123	5.3
Cal.	22.78	2,647	116	8,124	357	1,850	81	501	22	25.51	1.1	81	3.6
Colo.	22.33	2,384	107	9,078	407	1,699	76	270	12	16.12	0.7	63	2.8
Conn.	20.53	2,378	116	4,289	209	1,812	88	450	22	19.56	1.0	69	3.4
Del.	21.00	1,697	81	3,197	152	1,313	63	378	18	19.50	0.9	56	2.7
D. C.	21.00	4,253	203	5,978	285	2,727	130	642	31	25.35	1.2	102	5.0
Ga.	15.24	1,421	93	2,301	151	984	65	314	21	13.28	0.9	43	2.8
Idaho	19.98	2,776	139	6,888	345	1,583	79	321	16	21.13	1.1	69	3.5
Ill.	22.31	2,826	127	8,195	367	1,867	84	599	27	22.63	1.0	83	3.7
Ind.	19.53	2,374	122	4,113	211	1,764	90	486	25	19.40	1.0	69	3.5
Iowa	20.50	2,515	123	3,909	191	1,432	70	356	17	17.17	0.8	61	3.0
Kans.	20.18	2,462	122	4,149	206	1,652	82	466	23	20.69	1.0	70	3.5
Ky.	17.70	2,355	133	3,750	212	1,215	69	364	21	18.86	1.1	60	3.4
La.	17.02	1,797	106	3,712	218	1,307	77	340	20	20.12	1.2	57	3.3
Me.	18.83	2,239	119	4,574	243	1,991	106	730	39	21.32	1.1	79	4.2
Md.	19.59	3,278	167	4,224	216	1,797	92	460	23	27.51	1.4	84	4.3
Mass.	21.39	3,178	149	4,223	197	1,982	93	373	17	26.09	1.2	81	3.8
Mich.	21.22	2,954	139	5,454	257	1,602	75	499	24	24.67	1.2	78	3.7
Minn.	21.54	4,007	186	7,391	343	2,429	113	590	27	26.68	1.2	100	4.6
Mo.	19.69	2,827	144	7,109	361	1,702	86	561	28	28.24	1.4	85	4.3
Mont.	23.29	3,396	146	5,207	224	1,552	67	311	13	24.07	1.0	75	3.2
Neb.	19.77	2,998	152	8,250	417	1,963	99	510	26	22.17	1.1	82	4.1
Nev.	21.00	4,634	221	9,770	465	1,728	82	474	23	29.03	1.4	99	4.7
N. H.	19.08	2,221	116	2,561	134	1,088	57	170	9	22.01	1.2	54	2.8
N. J.	23.36	2,759	118	12,829	549	2,187	94	671	29	27.27	1.2	94	4.0
N. Mex.	21.40	1,875	88	4,969	232	1,374	64	305	14	19.84	0.9	58	2.7
N. Y.	23.58	5,437	231	14,674	622	2,872	122	677	29	28.12	1.2	123	5.2
N. C.	15.00	3,124	208	3,139	209	1,313	88	394	26	17.81	1.2	66	4.4
N. D.	21.00	5,200	248	9,370	446	2,217	106	460	22	30.92	1.5	109	5.2
Ohio	21.00	3,678	175	11,461	546	2,096	100	505	24	23.42	1.1	91	4.3
Okla.	19.17	..	..	5,291	276	1,930	101	523	27	24.04	1.3	59*	3.1*
Ore.	21.00	4,676	223	7,626	363	1,515	72	405	19	26.28	1.2	91	4.3
Pa.	21.00	2,390	114	4,874	232	1,877	89	545	26	22.11	1.1	75	3.6
R. I.	20.33	1,936	95	3,940	194	1,396	69	319	16	19.50	1.0	58	2.9
S. D.	19.69	2,000	102	2,318	118	1,475	75	431	22	26.93	1.4	68	3.5
Tenn.	15.38	1,751	114	3,031	197	928	60	280	18	14.28	0.9	45	2.9
Texas	20.75	3,117	150	4,179	201	1,502	72	452	22	23.57	1.1	76	3.7
Utah	20.63	2,820	137	8,664	420	1,648	80	339	16	25.20	1.2	76	3.7
Vt.	17.68	1,184	67	2,125	120	1,188	67	266	15	15.56	0.9	44	2.5
Va.	15.70	1,939	124	3,442	219	1,213	77	358	23	15.98	1.0	54	3.4
Wash.	21.00	5,111	243	8,979	428	1,676	80	458	22	26.97	1.3	99	4.7
W. Va.	21.00	3,963	189	11,042	526	1,980	94	597	28	22.56	1.1	94	4.5
Wis.	19.92	3,456	173	8,558	430	2,737	137	549	28	25.11	1.3	97	4.9
Wyo.	21.00	1,904	91	4,253	203	1,664	79	321	15	28.04	1.3	68	3.2
All	20.08	2,935	146	6,152	299	1,712	85	443	22	22.73	1.1	76	3.7
N.Y.**	23.58	5,437	231	14,674	622	2,979	126	703	30	28.88	1.2	126	5.3
Fla.**	15.43	1,737	113	2,572	167	1,200	78	363	24	14.02	0.9	50	3.2

**Effective July 1, 1935.

*Determined by substituting the actual average cost of a fatal case, on the basis of common law. This was done because the Oklahoma Compensation Act excludes death from its coverage.

†As previously explained, this average cost is for all temporary total cases inclusive of those not entitled to benefits because of the waiting period provisions. Consequently these values are much lower than the average for those actually receiving benefits.

TABLE 2

Relative Costs and Equivalent Durations—Based on a Single Average Wage for All States

Estimated average cost per case, based on an average weekly wage of $28.37, and equivalent duration of payments, expressed in numbers of weeks at the full average weekly wage of $28.37. Calculations made using the American Accident Table and the Benefit Provisions of the Compensation Acts effective May 1, 1935. These values are based solely on theoretical estimates.

State	TYPE OF BENEFIT											
	Fatal		Permanent Total Disability		Major Permanent Partial Disability		Minor Permanent Partial Disability		Temporary Total Disability†		All Types of Disability†	
	Average Cost Per Case	Equivalent Duration In Weeks	Average Cost Per Case	Equivalent Duration In Weeks	Average Cost Per Case	Equivalent Duration In Weeks	Average Cost Per Case	Equivalent Duration In Weeks	Average Cost Per Case	Equivalent Duration In Weeks	Average Cost Per Case	Equivalent Duration In Weeks
Alabama	$2,142	76	$3,962	140	$1,400	49	$436	15	$19.11	0.6	$62	2.2
Arizona	7,013	247	15,688	553	2,756	97	730	26	42.03	1.5	150	5.3
California	3,071	108	9,841	347	2,240	79	606	21	30.85	1.1	97	3.4
Colorado	2,728	96	10,462	369	1,927	68	311	11	18.58	0.7	72	2.5
Connecticut	3,142	111	5,793	204	2,448	86	607	21	26.37	0.9	93	3.3
Delaware	2,066	73	3,449	122	1,617	57	465	16	23.96	0.8	69	2.4
Dist. of Col.	4,419	156	6,294	222	3,527	124	830	29	32.79	1.2	129	4.5
Georgia	2,292	81	3,727	131	1,624	57	517	18	21.88	0.8	70	2.5
Idaho	3,189	112	7,393	261	2,055	72	487	17	23.89	0.8	85	3.0
Illinois	2,874	101	8,343	294	2,117	75	662	23	25.63	0.9	92	3.2
Indiana	2,952	104	4,370	154	2,212	78	609	21	24.29	0.9	86	3.0
Iowa	2,944	104	4,618	163	1,692	60	420	15	20.25	0.7	72	2.5
Kansas	2,938	104	5,279	186	2,103	74	592	21	26.28	0.9	87	3.1
Kentucky	2,730	96	4,764	168	1,416	50	425	15	24.32	0.9	72	2.5
Louisiana	2,742	97	5,600	197	1,972	70	513	18	30.30	1.1	86	3.0
Maine	2,756	97	5,157	182	2,587	91	949	33	27.65	1.0	102	3.6
Maryland	3,491	123	4,422	156	2,274	80	582	21	35.96	1.3	101	3.6
Massachusetts	3,186	112	4,306	152	2,023	71	416	15	30.34	1.1	87	3.1
Michigan	3,454	122	6,444	227	1,893	67	590	21	29.10	1.0	92	3.2
Minnesota	4,356	154	7,772	274	2,906	102	708	25	31.98	1.1	116	4.1
Missouri	3,963	140	8,870	313	2,216	78	730	26	36.70	1.3	112	3.9
Montana	3,814	134	5,891	208	1,756	62	351	12	27.21	1.0	85	3.0
Nebraska	3,464	122	9,993	352	2,284	81	593	21	25.75	0.9	95	3.3
Nevada	5,533	195	11,020	388	2,055	72	563	20	34.01	1.2	117	4.1
New Hampshire	2,808	99	3,328	117	1,413	50	227	8	28.56	1.0	72	2.5
New Jersey	3,040	107	14,385	507	2,452	86	752	27	30.52	1.1	105	3.7
New Mexico	2,220	78	5,782	204	1,603	57	355	13	23.05	0.8	67	2.4
New York	6,138	216	15,451	545	3,228	114	760	27	32.79	1.2	139	4.9
North Carolina	4,764	168	4,876	172	2,125	75	638	22	28.78	1.0	105	3.7
North Dakota	5,824	205	10,269	362	2,732	96	567	20	38.09	1.3	129	4.5
Ohio	4,221	149	13,866	489	2,537	89	611	22	28.29	1.0	109	3.8
Oklahoma	...	...	6,450	227	2,485	88	659	23	30.45	1.1	95*	3.3*
Oregon	4,676	165	7,626	269	1,549	55	416	15	31.73	1.1	96	3.4
Pennsylvania	2,659	94	5,178	183	2,066	73	600	21	24.43	0.9	83	2.9
Rhode Island	2,204	78	4,371	154	1,538	54	351	12	24.74	0.9	67	2.4
South Dakota	2,113	74	2,858	101	1,820	64	532	19	33.17	1.2	82	2.9
Tennessee	2,768	98	4,261	150	1,532	54	466	16	23.70	0.8	74	2.6
Texas	3,895	137	5,286	186	1,890	67	572	20	29.76	1.0	95	3.3
Utah	3,354	118	10,836	382	1,985	70	409	14	30.12	1.1	91	3.2
Vermont	1,746	62	3,000	106	1,677	59	376	13	21.92	0.8	62	2.2
Virginia	2,746	97	4,492	158	1,760	62	519	18	23.16	0.8	77	2.7
Washington	5,111	180	8,979	317	1,676	59	458	16	26.97	1.0	99	3.5
West Virginia	3,992	141	12,626	445	2,264	80	682	24	25.76	0.9	103	3.6
Wisconsin	4,550	160	11,995	423	4,223	149	751	26	41.65	1.5	142	5.0
Wyoming	1,904	67	4,253	150	1,664	59	321	11	28.04	1.0	68	2.4
All States—Arithmetic Aver.	3,454	122	7,192	254	2,118	75	549	19	28.33	1.0	93	3.3

*Determined by substituting the actual average cost of a fatal case, on the basis of common law. This was done because the Oklahoma Compensation Act excludes death from its coverage.

†As previously explained, this average cost is for all temporary total cases inclusive of those not entitled to benefits because of the waiting period provisions. Consequently these values are much lower than the average for those actually receiving benefits.

TABLE 3

COMPARISON OF AVERAGE COSTS AND EQUIVALENT DURATIONS FOR DIFFERENT WAGE LEVELS COUNTRYWIDE AVERAGES

KIND OF BENEFIT	Average Cost per Case Theoretical Estimates		Indicated Change	Average Equivalent Duration		Indicated Change
	Table 2	Table 1		Table 2	Table 1	
Fatal	$3,454	$2,935	.850	122	146	1.197
Permanent Total..	7,192	6,152	.855	254	299	1.177
Major	2,118	1,712	.808	75	85	1.133
Minor	549	443	.807	19	22	1.158
Temorary Total...	28.33	22.73	.802	1.0	1.1	1.100
All Benefits.....	93	76	.817	3.3	3.7	1.121
Average Wage....	28.37	20.08	.708			

TABLE 4

EXHIBIT OF ACTUAL AVERAGE INCURRED COSTS PER CASE — FOR SERIOUS INJURIES*

Year	TYPE OF BENEFIT							
	Fatal		Permanent Total		Major Permanent Partial		All Serious Cases	
	No. of Cases	Average Incurred Cost per Case	No. of Cases	Average Incurred Cost per Case	No. of Cases	Average Incurred Cost per Case	No. of Cases	Average Incurred Cost per Case
1932	2,759	$3,686	194	$7,189	4,363	$2,327	7,316	$2,968
1931	3,368	3,887	315	7,662	5,497	2,600	9,180	3,246
1930	4,283	4,020	373	8,306	7,005	2,675	11,661	3,349
1929	4,983	4,034	458	8,396	8,416	2,718	13,857	3,379
1928	4,667	4,046	458	8,569	7,778	2,679	12,903	3,383
1927	4,645	3,908	430	7,798	7,199	2,612	12,274	3,284
1926	4,419	3,878	399	7,685	7,219	2,477	12,037	3,164
1925	4,287	3,782	401	7,889	6,738	2,456	11,426	3,144
1924	4,021	3,677	374	7,582	6,216	2,368	10,611	3,048
1923	4,216	3,550	360	6,949	6,463	2,317	11,039	2,939
1922	3,612	3,217	375	6,568	5,943	2,125	9,930	2,690
1921	2,999	3,123	315	6,795	4,793	2,106	8,107	2,665
1920	2,942	3,205	332	6,840	4,977	2,121	8,251	2,697
1919	3,013	2,944	424	5,785	5,441	1,956	8,878	2,474
1918	2,839	2,762	401	5,718	4,555	1,766	7,795	2,332
All Years	57,053	3,643	5,609	7,348	92,603	2,395	155,265	3,033

* Based on Policy Year data for the following States; for the years available.

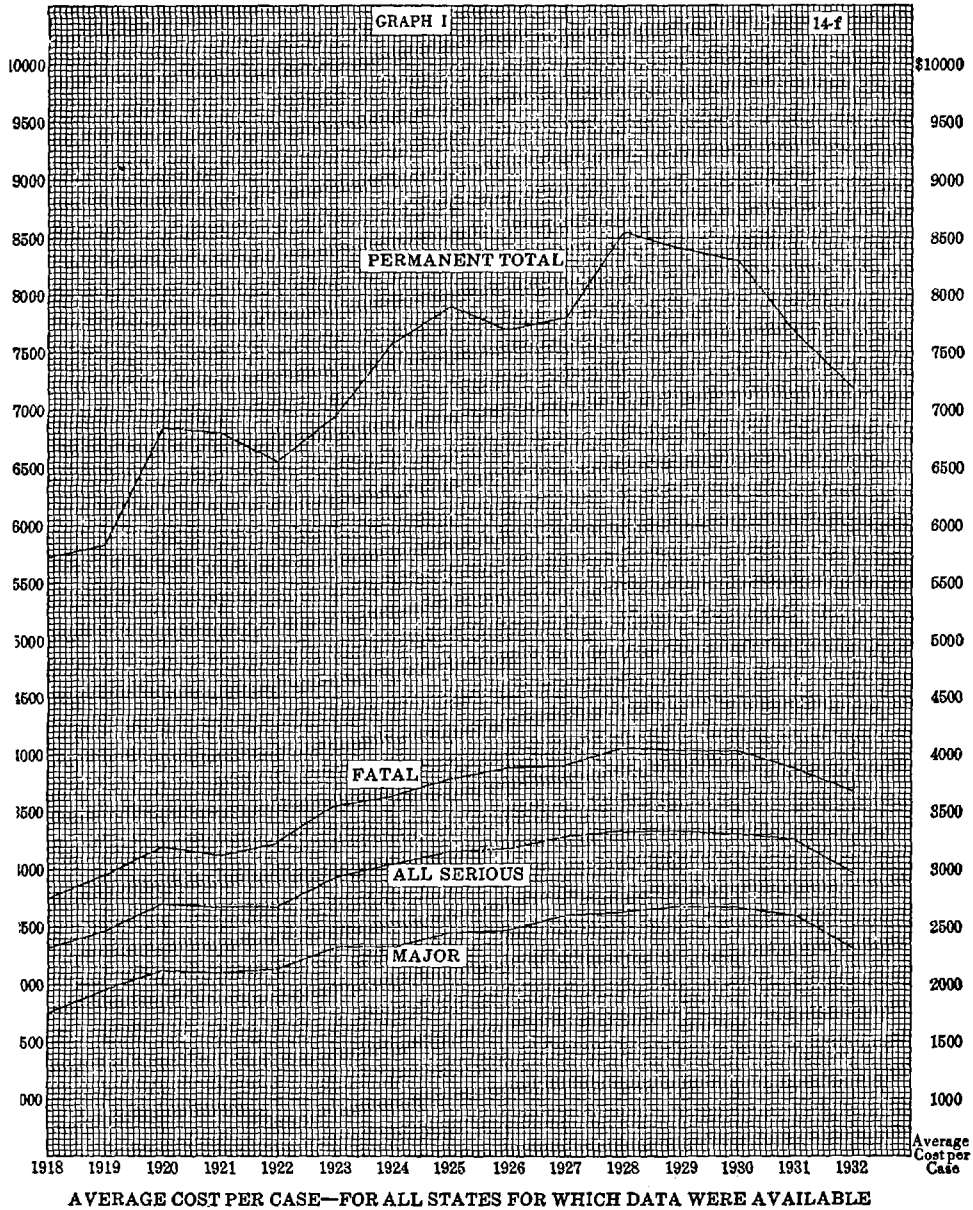
Alabama	Indiana	Minnesota	Oklahoma
Arizona	Iowa	Missouri	Rhode Island
California	Kansas	Montana	South Dakota
Connecticut	Kentucky	Nebraska	Tennessee
District of Columbia	Louisiana	New Hampshire	Texas
Colorado	Maine	New Jersey	Utah
Georgia	Maryland	New Mexico	Vermont
Idaho	Massachusetts	New York	Virginia
Illinois	Michigan	North Carolina	Wisconsin

TABLE 5

SUMMARY OF MEDICAL BENEFITS PROVIDED BY THE VARIOUS STATE COMPENSATION STATUTES*

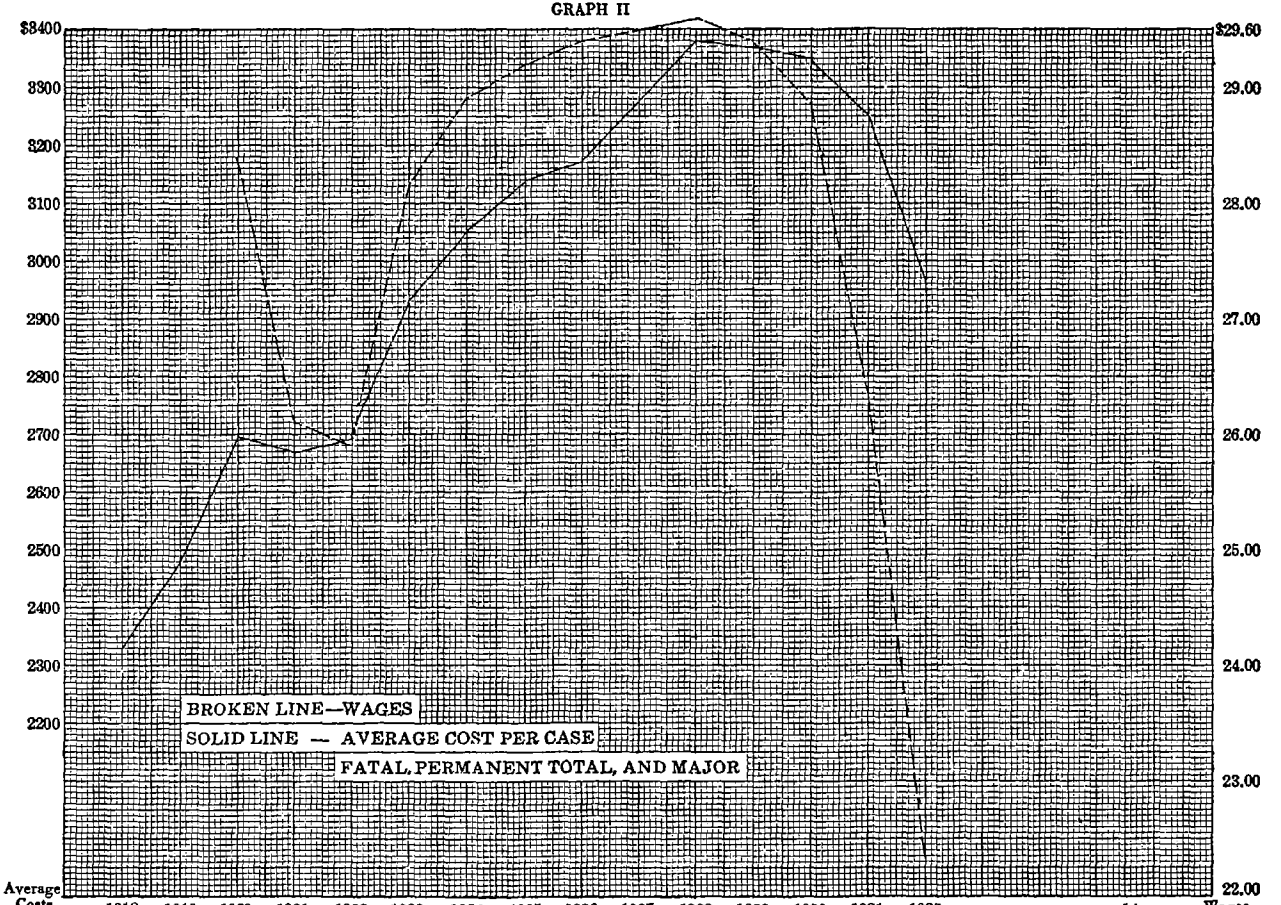
State	Medical Provisions	
	Maximum Amount	Maximum Duration
Alabama	$100	60 days
Arizona	Unlimited 1 year may require employees to contribute half cost of insurance, max. $1.00 a month per employee	
California	Unlimited	Unlimited
Colorado	500	4 months
Connecticut	Unlimited	Unlimited
District of Columbia	Unlimited	Unlimited
Delaware	150	30 days
Georgia	100	30 days
Idaho	Unlimited	Unlimited
Illinois	Unlimited	Unlimited
Indiana	Unlimited	60 days
Iowa	300	Unlimited
Kansas	500	Unlimited
Kentucky	200	Unlimited
Louisiana	250	Unlimited
Maine	Unlimited	Unlimited
Maryland	500	Unlimited
Massachusetts	Unlimited	Unlimited
Michigan	Unlimited	90 days
Minnesota	Unlimited	Unlimited
Missouri	Unlimited	Unlimited
Montana	500	6 months
Nebraska	Unlimited	Unlimited
Nevada	Unlimited 1½ years may collect one-half cost from employees max. $1.00 a mo. per employee	
New Hampshire	Unlimited	30 days
New Jersey	Unlimited	Unlimited
New Mexico	350	Unlimited
New York	Unlimited	Unlimited
North Carolina	Unlimited	Unlimited
North Dakota	Unlimited	Unlimited
Ohio	Unlimited	Unlimited
Oklahoma	Unlimited	Unlimited
Oregon	Unlimited	Unlimited
Pennsylvania	100 med. and unlimited hospital treatment for 30 days	30 days
Rhode Island	150	8 weeks
South Dakota	200	12 weeks
Tennessee	200	30 days
Texas	Unlimited	6 weeks
Utah	Unlimited	Unlimited
Vermont	50	14 days
	Plus hospital	
	150	30 days
Virginia	Unlimited	180 days
Washington	Unlimited	Unlimited
	separate medical aid fund from assessments on employers one-half of which may be collected from employees	
West Virginia	800 plus an additional 600 if permanent disability may be reduced thereby	Unlimited
Wisconsin	Unlimited	Unlimited
Wyoming	300	Unlimited

* Where benefits are not subject to definite limitation but may be extended indefinitely by commission ruling or otherwise, the word "unlimited" is used. Compiled as of May 1, 1935.



AVERAGE COST PER CASE—FOR ALL STATES FOR WHICH DATA WERE AVAILABLE

GRAPH II


$3400
3300
3200
3100
3000
2900
2800
2700
2600
2500
2400
2300
2200
$29.60
29.00
28.00
27.00
26.00
25.00
24.00
23.00
22.00
BROKEN LINE—WAGES
SOLID LINE — AVERAGE COST PER CASE
FATAL, PERMANENT TOTAL, AND MAJOR
Average Costs
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
14-g
Wages

PART II

The Determination of the Cost of the Benefits—by Theoretical Means

In the foregoing part of this paper, the basis for a table of relative costs and durations is discussed and a table based upon certain assumptions has been constructed. It is proposed, in this part, to give a more careful analysis of the detailed procedure followed in the construction of this table, with appropriate examples of the details of the calculation.

In order to determine the cost of any given set of benefit provisions there are only two basic sets of data required. One of these is a detailed analysis of the benefits payable for various types of injuries and to dependents in case of death, and the other is a distribution of the recipients of these benefits in classifications comparable to those for which the benefits are outlined. The sum of the benefits received by each case will naturally equal the total cost of the benefits. This procedure reduces the problem to its simplest terms. In actual practise other considerations enter. In the first place, it is necessary to have a distribution of accidents and dependency conditions containing a large enough number of cases to be an indicative distribution. In the second place, since benefits in the majority of cases are payable as a percentage of wages, further complicated by the introduction of weekly minimum and maximum limits as well as limits to total monetary cost, it is necessary to obtain either the actual wages upon which compensation will be paid, or else a wage distribution which may be used as an acceptable substitute.

When the first compensation acts were introduced there were many divergent estimates of the possible cost of the various types of benefits. It was recognized early that both for the purposes of estimating the cost of future changes in benefit provisions, as well as for the purposes of the early rate making systems, it would be necessary to have available, as far as possible, standard distributions which would assist in the calculations. Of particular importance are two such distributions, the American Accident Table and the standard wage distributions.

The American Accident Table, fully described in an earlier paper in the *Proceedings,* is reproduced in the form most convenient for use in calculating the cost of benefit provisions.* It is sufficient to state that this distribution is based upon statistics of some 500,000 accidents and was compiled with great care and thoroughness. It is of course doubtful whether the distribution is typical of actual conditions in any state, but it is based upon a larger volume of data than is available in any one state and at least one check was made many years subsequent to its original compilation which showed the table to be essentially correct in the light of statistics available at that date.

The other standard distribution which is used is the wage distribution on which is based the calculation of the effect of limits to compensation. This is needed because of the work which would be entailed if it were attempted to calculate the effect of the minimum and maximum weekly limits, which work would be greatly increased and require the detailed wage distributions for each state to complete the calculation. Possibly a somewhat fuller explanation of the effect of the limits may be made here, even though the subject has been discussed by others.

If the percentage of compensation were 50 and the minimum were $5 and the maximum $21, only those cases whose average wages were between $10 and $42 would receive compensation at the rate of 50%. The others would receive either the minimum of $5 (if the average weekly earnings were below $10) or else the maximum of $21 (if the average weekly earnings were above $42).

An example of the required calculation is shown in Table 7, Effect of Limits.

Fortunately, however, a standard wage distribution and a technique for its use has been developed† which greatly shortens the amount of labor required and obviates the necessity for obtaining a wage distribution each time the effect of limits has to be calculated.

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* See forms C 1, 2 and C 3, 4, 5, Tables 9 and 10.

† A. H. Mowbray—cf. previous citation.
W. W. Greene—The Compensation Ratemaking Problem in the Light of 1923-1924 Revision, *Proceedings,* Vol. X.
Paul Dorweiler—On Variations in Compensation Losses with Changes in Wage Levels, *Proceedings,* Vol. XVIIII.

It is now possible to summarize the steps which must be taken in the calculation of the cost of a set of benefit provisions. These are:—

1. An analysis in detail of the benefit provisions of a compensation act. This must be in a form suitable for use with the American Accident Table. Such an analysis is shown in Table 8.
2. The determination, in units of weeks wages, of the cost of providing these benefits to the beneficiaries listed in the American Accident Table. The details of this procedure are shown in Tables 9 and 10. An additional explanation of the various steps is also made.
3. The evaluation, on the basis of the standard wage distribution, of the effect of the minimum and maximum weekly limits.
4. The determination of the monetary cost, on the basis of the number of weeks wages, the effect of the limits, and the average weekly wage. This is shown in Table 11.

In Table 12 the calculations underlying the average values used in the table of relative costs and equivalent durations are shown in detail. Essentially the process consists of determining the average cost of a case and from this value then deriving what the average duration of payments would be if the weekly compensation were the full average weekly earnings.

Probably of more practical importance are the calculations outlined in Tables 13 and 14. In these tables are shown the final steps in determining the average over-all effect of a proposed change in a given set of benefits. The procedure consists of calculating first the monetary cost of the present benefits and then the cost of the proposed benefits. By comparing the two sets of figures an indicated change for each type of benefit is obtained. Since the percentages of the total cost for each type of injury may be different in each state it is necessary to distribute the effect of the change in proportion to the percentage of the total that can be attributed to that type of injury. This is shown in Table 14.

The examples of the calculation which have been chosen are for a state whose benefit provisions are unusually easy to evaluate. The general procedure is the same for all states, but departures and special calculations must be made to fit the particular set of benefit provisions under consideration. In addition it may be noted that there are certain types of benefits which are not considered, as for example, temporary partial. It is necessary to analyze separately those provisions which do not lend themselves to the standard procedure and determine, very often on the basis of judgment, the probable cost of such benefits.

TABLE 7—EFFECT OF LIMITS

(1) Weekly Wage (Assumed)	(2) No.of Cases (Assumed)	(3) Total Weekly Wages (1) × (2)	(4) Amount Payable if 50% Was Paid in All Cases (3) × .50	(5) Effect of Minimum: Number of Cases Affected	(6) Effect of Minimum: Amount (5) × $5	(7) Amount Actually Paid at 50%	(8) Effect of Maximum: No. of Cases Affected	(9) Effect of Maximum: Amount (8) × $21	(10) Total Amount Actually Payable (6) + (7) + (9)	(11) Effect of Limits. Limit Factor Ratio of Amount with Limits to Amount Without Limits (10) ÷ (4)
$4	2	$8	$4	2	$10	..	..	..	$10	..
6	4	24	12	4	20	..	..	..	20	..
8	6	48	24	6	30	..	..	..	30	..
10	10	100	50	..	..	$50	..	..	50	..
16	20	320	160	..	..	160	..	..	160	..
21	40	840	420	..	..	420	..	..	420	..
26	40	1,040	520	..	..	520	..	..	520	..
32	30	960	480	..	..	480	..	..	480	..
42	20	840	420	..	..	420	..	..	420	..
48	12	576	288	..	..	..	12	$252	252	..
54	10	540	270	..	..	..	10	210	210	..
60	6	360	180	..	..	..	6	126	126	..
	200	5,656	2,828	..	..	..	..	..	2,698	.9540
	Average	$28.28	$14.14	..	..	..	..	..	$13.49	..

TABLE 8

Analysis of the Benefit Provisions of a Compensation Act

1. Fatal:

   Burial expenses—$200.

   To those wholly dependent:

   50% of the employee's average weekly wages subject to a minimum of $5 and maximum of $21 weekly, continuing for a maximum period of 312 weeks.
   Benefits do not cease upon the death of a dependent but are paid to other dependents, if any.
   Benefits cease upon remarriage of a widow unless there are other dependents.
   Benefits to children cease when they attain 18 years of age unless incapacitated.

2. Permanent Total Disability:

   50% of the average weekly wages subject to a minimum of $5 and a maximum of $21 weekly continuing during total incapacity but not longer than 520 weeks.

3 and 4. Permanant Partial Incapacity—Major and Minor permanent partial:

   In addition to compensation for the period of total disability 50% of the average weekly wages subject to a minimum of $5 and a maximum of $21 weekly for certain specified periods for specified injuries. (See valuation sheets.)

5. Temporary Total Disability:

   50% of the average weekly wages subject to a minimum of $5 and a maximum of $21 for the period of disability but not longer than 520 weeks. Waiting period 7 days retroactive to date of injury at 28 days.

6. Medical Benefits:

   Such reasonable medical and hospital care as is necessary.

C 1 & 2 AMENDED

(1) Class of Injury	(2) No. of Cases	(3) Person Receiving Compensation	(4) No. of Dependents	(5) Assumed Average Age	(6) Period for Which Compensation is Payable	(7) Annuity Symbol	(8) Annuity Value (1 per year) for Period in (6)	(9) Annuity Value (1 per week) for Period in (6) or 52 x (8)	(10) Total Cost of Cases in (2) At 100% of Weeks Wages (9) x (2)	(11) Total Cost at Specified Percent of Wages in This Case 50% (10) x .50	
1 Fatal	762										
a Dependency											
	174	None	None	XXX		1					
	177	Widow alone	1	47	312 weeks	$1_6\bar{a}_{47}$	5.1444	267.51	47,349		Danish Female Survivorship and Dutch Remarriage
Sum of cases	79	Widow with	1	36		$a_{\overline{312}\vert}$		281.8127	91,589		
of multiple		child	1	8		"					All commutation tables at 3½%
dependency											
a + b + c + d	68	Widow with	1	36		"					
= 325		children	2	8		"					
Inasmuch as	47	Widow with	1	36		"					
the difference		children	3	8		"					
between a a	28	Widow with	1	36		"					
joint life		children	4	8		"					
contingency	17	Widow with	1	36		"					
and an annu-		children	5	8		"					
ity certain for	14	Widow with (More	1	36		"					
a limited term		children than 5)	7*	8		"					
is not ap-											
preciable, for	13	Orphan	1	8	312	$1_6\bar{a}_{8}$	5.3831	279.92	3,639		U. S. Life Tables
the purpose of	6	Orphans	2	8		$a_{\overline{312}\vert}$					
simplicity a	3	Orphans	3	8		"					
simple annu-	2	Orphans	4	8		"					
ity certain is											
used.	2	Orphans (More than 4)	6*	8		"					
b	2	Widow and	1	47		"					
		parent	1	61		"					
		Widow and	1	36		"					
	2	children	2*	8		"					
		Other dependent	2*	61		"					
	66	Parent	1	61	312	$1_6\bar{a}_{61}$	4.9111	255.38	16,855		
* Average c	35	Parents	2	61		$a_{\overline{312}\vert}$					
(assumed)	7	Brother or Sister	1	11	312	$1_5\bar{a}_{11}$	5.3850	280.02	1,960		
	2	Brothers or Sisters	2	11		$a_{\overline{312}\vert}$					
	1	Brothers or Sisters	4*	11		"		Total	161,392	80,696	
	5	Parent	1	50		"				weekswages	
d		Brother or Sister	1	11		"					
	3	Parent	1	50		"					
		Brothers or Sisters	2	11		"					
	2	Parent	1	50		"					
		Brothers or Sisters	4*	11		"					
	4	Parents	2	50		"					
		Brothers or Sisters	3*	11		"					
	3	Other Dependents	3*	61		"					
b. Burial	762				$200					$152,400	
	14	Injured (No dependents)		42	520	$1_{10}\bar{a}_{42}$	8.0204	417.06	25,858	19,929	
2 Perm. Total	48	Injured (With dependents)		42	520	$1_{10}\bar{a}_{42}$				weekswages	

N. C. 211

TABLE 9

EXPLANATION

FORM C 1 AND 2 FATAL AND PERMANENT TOTAL DISABILITY

Column (1)—Subdivisions for the type of injury.

Column (2)—Number of subtotals of cases.

Column (3)—Description of dependents.

Column (4)—Number of dependents in each subgroup.

Column (5)—Assumed average age of dependents.

Column (6)—Gives additional information—derived from the analysis of the benefit provisions (see exhibit). In this particular instance 312 weeks is specified.

Column (7)—In order to make the estimates on a present value basis appropriate annuity values must be employed. In this case either an annuity certain for 312 weeks or a temporary life annuity for 6 years (52 weeks $\times$ 6 = 312 weeks) is employed in the case of single dependents. The interest rate in all cases is 3½% and the mortality is that of the United States Life Tables except in the case of the widow (aged 47) where the tables are the combined Danish Female—Survivorship and Dutch Remarriage.

Column (8)—Shows the tabular values for the annuity symbols in Column (7).

Column (9)—Shows all values in weeks units. Usually Column (8) multiplied by 52. This really is the cost in weeks wages for each case in Column (2) and (3).

Column (10)—Shows the total cost for the number of cases in the group. For convenience one multiplication has been made for the 325 cases using an annuity certain.

Column (11)—Shows the total cost in weeks wages at the specified percentage allowed by law. The monetary amount payable for burial is merely the number of fatal cases extended at $200, the funeral allowance.

	(1) Class of Injury	(2) Type of Disability	(3) How Valued	(4) No. of Cases	(5) Duration of Payments	(6) Commuted Duration (See* Table)	(7) Cost at 100% Compensation (4) x (6) or (5)	(8) Nominal Percentage of Compensation	(9) Cost at Nominal Percentage of Compensation (7) x (8)
	3. Maj. Perm.	(a) Dismemb.	(Specific Schedule)						
			Arm	61	225	208.99	12,748		
			Hand	86	175	165.19	14,206		
			Leg	62	208	194.26	12,044		
			Foot	43	156	148.17	6,371		
			Eye	290	156	148.17	42,969		
			Hearing Both Ears	1	156	148.17	148		
			(Total of 3 (a))	543	XXXX		88,486	50	44,243
		(b) Perm. Partial (Loss of Use)	90% of Major Dismemberment	381		146.66	55,877	50	27,939
		(c) Perm. Total (all other)	If Law provides for such.						
		(d) Temp. Total	20 Weeks Duration per Maj. Perm. Case	924	20	XXXX	18,480	50	9,240
	4. Min. Perm.	(a) Dismemb.	(Specific Schedule)						
			Thumb	96	60	58.81	5,646		
			1 phal. Thumb	152	30		4,560		
			1st Finger	301	38		11,438		
			1 phal. 1st Finger	261	12⅔		3,306		
			2nd Finger	147	30		4,410		
			1 phal. 2nd Finger	172	10		1,720		
			3rd Finger	104	25		2,600		
			1 phal. 3rd Finger	89	8⅓		742		
			4th Finger	119	20		2,380		
			1 phal. 4th Finger	65	6⅔		433		
	Taken at ½ thumb and fi	the sum of the ngers.	Thumb or Finger & Loss or injury other Fingers	532	86½	84.04	44,709		
			Great Toe	37	38		1,406		
			1 phal. Great Toe	16	19		304		
			1 other Toe	19	13		247		
			1 phal. other Toe	11	6½		72		
			1 Toe and loss or injury other Toes	35	45		1,575		
			Hearing (1 Ear)	5	52	51.10	256		
			(Total of 4 (a))	2161	XXXX		85,804	50	42,902
		(b) Perm. Partial (Loss of Use)	90% Aver. Minor Dismemberment	703		35.74	25,125	50	12,563
		(c) Perm. Partial (all other)	If Law provides for such.						
5. Based on commutation tables constructed from the American Accident Table.		(d) Temp. Total	5 Weeks Duration per Minor Perm. Case	2864	5	XXXX	14,320	50	7,160
	5. Temp. Total	(a) Temp. Total	See T. T. Table	XXX	XXXX	XXXX	181,154	50	90,577

NOTES:—Lines 3 (b) and 4 (b) refer to cases "related to Dismemberment".
Col. 3—line 3 (d) Formula is: 20—waiting period in weeks But ignore retroactive waiting period.
Col. 3—line 4 (d) Formula is: 5—waiting period in weeks But ignore retroactive waiting period.

Col. 4—line 3 (d) {(Total of 3 (a)+3 (b)+3 (c)} —line 4 (d) {(Total of 4 (a)+4 (b)+4 (c)}

*Do not commute duration of less than 52 weeks.

TABLE 10

EXPLANATION

FORM C 3, 4 AND 5, MAJOR, MINOR AND TEMPORARY TOTAL

Columns (5) and (8) are based on the benefits allowed in the law.

Column (6) is the present value of the weekly annuities (at 3½%) for those durations which exceed 52 weeks or a year.

Subdivisions (b) for major and minor are based upon 90% of the average cost of a case in (a).

Subdivisions (d) for major and minor are based upon auxiliary data showing the average healing period or period of temporary total disability to be 20 weeks for a major and 5 weeks for a minor case.

Temporary Total—This value is based upon commutation columns constructed on the basis of the durations of disability lasting one day or more, two days or more, etc., as shown in the American Accident Table. By the use of these tables it is possible to compute the number of weeks of compensation that must be paid for the appropriate waiting period and retroactive feature.

TABLE 11

SUMMARY OF VALUATION AND TRANSLATION INTO MONETARY COST

(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)
Class of Injury	Kind of Benefit	Benefits in Week's Wages (Without Limits)	% Comp. Rate	Limits on Weekly Compensation		..... Aver. Wage $20.53		
				Lower (a)	Upper (b)	Limit Factor	Week's Wages with Limits (3) x (6)	Monetary Cost: Sub-Totals of (7) x Average Wage
Fatal	(a) Dependency	80,698	50	$5	$21	1.0019	80,849	$1,659,830
	(b) Burial	XXXX	XX	XX	XX	XXXX	XXXXXXX	152,400
	(c) Pay'ts to State	XXXX	XX	XX	XX	XXXX	XXXXXXX	
	(d)							
						Sub-Total	XXXXXXX	1,812,230
Perm. Total	(a)	12,929	50	5	21	1.0019	12,954	
	(b)							
						Sub-Total	12,954	265,946
Maj. Perm.	(a) Dismemb. Perm. Part.	44,243	50	5	21	1.0019	44,327	
	(b) (Loss of Use) Perm. Part.	27,939	50	5	21	1.0019	27,992	
	(c) (all other)							
	(d) Temp. Total	9,240	50	5	21	1.0019	9,258	
						Sub-Total	81,577	1,674,776
Min. Perm.	(a) Dismemb. Perm. Part.	42,902	50	5	21	1.0019	42,983	
	(b) (Loss of Use) Perm. Part.	12,563	50	5	21	1.0019	12,587	
	(c) (all other)							
	(d) Temp. Total	7,160	50	5	21	1.0019	7,174	
						Sub-Total	62,744	1,288,134
Temp. Total	(a)	90,577	50	5	21	1.0019	90,749	
						Sub-Total	90,749	1,863,077

NOTES:—Col. (3) from respective "Valuation" Sheets.
Col. (6), (10), (14)—From "Limit Factor" Sheet for State.
Lines 3 (b) and 4 (b) Refer to cases "related to dismemberment".

TABLE 12

CALCULATION OF VALUES FOR THE TABLE OF RELATIVE COSTS AND EQUIVALENT DURATIONS

Kind of Benefit	(1) No. of Cases	(2) Average Weekly Wage	(3) Total Monetary Cost	(4) Average Cost (3) ÷ (1)	(5) Average Duration (4) ÷ (2)
Fatal	762	$20.53	$1,812,230	$2,378	116
Permanent Total	62		265,946	4,289	209
Permanent Partial Major.	924		1,674,776	1,813	88
Permanent Partial Minor.	2,864		1,288,134	450	22
Temporary Total.....	95,388		1,863,077	19.53	1.0
All Benefits	100,000		6,904,163	69	3.4

TABLE 13

DETERMINATION OF THE EFFECT OF A CHANGE IN BENEFITS — BY TYPE OF BENEFIT

Kind of Benefit	(1) Total Monetary Cost of Present Benefits	(2) Total Monetary Cost of Proposed Benefits (Assumed)	(3) Ratio of Cost of Proposed Benefits to Present Benefits (2) ÷ (1)
Fatal	$1,812,230	$2,361,839	1.303
Permanent Total	265,946	327,911	1.234
Permanent Partial Major	1,674,776	1,879,099	1.122
Permanent Partial Minor	1,288,134	1,418,235	1.101
Temporary Total	1,863,077	2,299,037	1.234

TABLE 14

DETERMINATION OF THE AVERAGE OVERALL EFFECT OF A CHANGE IN BENEFITS

Kind of Benefit	(1) Effect of Change	(2) Percentage of Total Costs Previously Incurred for Each Type of Benefit (Used as Weights)	(3) Weighted Effect (1) × (2)
Fatal	1.303	10.1	13.2
Permanent Partial	1.234	2.2	2.7
Permanent Partial Major	1.122	9.7	10.9
Permanent Partial Minor	1.101	11.1	12.2
Temporary Total	1.234	22.3	27.5
Medical	1.000	44.6	44.6
All Benefits		100.0	111.1
Or an Indicated Increase of 11.1% (111.1 — 100.0)			

PART III

Some Statistical Comparisons of Actual Results and Theoretical Estimates

It is desirable to have the validity of any theoretical computation borne out by actual results. Unfortunately it is almost impossible to obtain figures which can be said to be comparable in every sense and which can therefore be used as a verification of the theoretical procedure.

Some of the causes have been explained previously. At the expense of repetition, these are:

1. The differences in accident frequency and dependency distribution.
2. The differences in administrative policies.
3. The differences in wage scales.
4. The differences in predominating types of industries and, consequently, in typical injuries.
5. The inadequacy of statistical data.

Even though it is extremely difficult to prove by rigid means the accuracy of the procedure that has been followed in determining the estimated effect of benefit changes, the same procedure has been in effect for a great many years. This is due to the fact that it has been more or less standardized and carefully and painstakingly developed. Its practical advantages are that it is simple to follow and can be used to give an estimate in a reasonable space of time, a factor of great importance when legislation is under consideration. In addition, the method of application is such as to take the utmost advantage of compensating errors. As far as possible the same assumptions are made, and the same auxiliary tables employed in determining the theoretical cost of the benefits both before and after changes, with the result that, when the indicated change is obtained in the form of a ratio of one cost to the other, errors due to assumptions or approximations, since they occur in both the numerator and denominator of the ratio, are, to a very large extent, cancelled. Hence both from the practical and theoretical viewpoint, the procedure is eminently satisfactory and may be expected to give reasonably correct results. In any case, it would be no easy task to find a substitute procedure that would have a higher degree of justification.

Despite the difficulties previously noted, it was thought that some indication of the accuracy of the procedure could be obtained by comparing for a number of states, over a period of years, the actual results with the theoretical estimates. This cannot be done for all types of injury, but data are available for fatal, permanent total and major permanent partial disability cases. Ten of the major industrial states, for which such reports were available, were chosen, and average costs per case calcu-

lated on both the theoretical and actual bases. The states having the larger volume of data were picked because it was felt that, the greater the number of cases, the more reliable would be the indications. Although an appreciable number of cases was available for both the fatal and major permanent partial group, the number in the permanent total group was rather small.

In making the calculations a possible discrepancy may be caused by the distribution of cases receiving compensation under different benefit provisions, when in a particular state an amendment became effective. For the theoretical values it is assumed that there is an even distribution of accidents occurring throughout the year. In actuality, this may not be true, either as a result of seasonal industrial activity or because of the method of reporting the data. Nevertheless it was felt reasonable to assume, that over a long period of time, for any particular state, the average cost of a case will reflect the changes in the benefit provisions and that therefore the degree of change on the actual basis will bear a close relationship to the degree of change indicated on the basis of the theoretical estimates. If this condition were found to exist, it would be an indication that changes indicated on the theoretical basis can be expected to be realized in actuality. It is not necessary that the actual values should be in absolute agreement with the theoretical, it being sufficient that the amount of change is approximately the same. The necessary requirements are met if an indicated increase of 10% in the theoretical values, which may or may not be close to the actual, results in an increase of 10% in the actual values. Graphically, this would be indicated if the curve for the theoretical estimates parallels that of the actual values.

The data for the ten states were combined and Tables 15 and 16 prepared which compare both the actual averages and the theoretical estimates. The data are also portrayed in Graphs III and IV. It was thought that in a test of this nature, the unweighted averages were of equal value with the weighted, so that both sets were calculated. The weighting process consisted in applying the number of cases occurring in each state to the theoretical averages for the state and then summing. The actual weighted averages were obtained by dividing the total cost by the total number of cases.

As will be seen by examining the graphs, the results are not materially different whether the weighted or unweighted averages are used. The curves, although not exactly parallel, are nevertheless in close agreement except for the permanent total group, which had too small a number of cases to be as indicative as the others. The major disability group, which is in general the least complicated of the benefit provisions and the simplest to evaluate, indicates that the theoretical averages are almost consistently too low, although the same approximate rates of change are indicated.

The data would seem to bear out the assumption that the indicated change in the cost of a case, computed by means of the theoretical procedure, is closely borne out by the changes in the actual values. Even the average costs are not far apart, those for fatal being usually very close together. It is of interest to note that the widest divergence occurs in the more recent years, when there was the smallest number of changes in the benefit provisions. This may possibly be explained by the fact that, in many states, the average weekly wage, either by administrative ruling, or provision in the compensation act, is based on the average of the preceding year or on the basis of full time employment. This may account for the actual averages in the last few years being somewhat higher than the theoretical estimates.

In summarizing, it would seem that, providing adequate data regarding average weekly wages and wage distributions are available, and a large number of cases are involved, changes in cost because of benefit amendments are predictable with reasonable accuracy by means of the theoretical procedure.

ACKNOWLEDGMENTS

This paper would not be complete without due acknowledgments to the writers of the papers appearing in previous *Proceedings* of the Society and in particular to Miss Outwater, and Messrs. Mowbray, Greene and Dorweiler, upon whose previous work and tables much of this paper is based. Practically all of the statistical data used in the exhibits were obtained from the National Council on Compensation Insurance. Almost all of the procedure for determining the theoretical cost of the benefit provisions of a compensation act was developed by the present and former members of the staff of this organization.

TABLE 15

EXHIBIT OF ESTIMATED THEORETICAL AVERAGES AND ACTUAL INCURRED AVERAGES
WEIGHTED ARITHMETIC AVERAGE FOR TEN STATES*

Year	Fatal			Permanent Total			Major			All Serious		
	No. of Cases	Est. Ave.	Act. Ave.	No. of Cases	Est. Ave.	Act. Ave.	No. of Cases	Est. Ave.	Act. Ave.	No. of Cases	Est. Ave.	Act. Ave.
1932	1,904	$3,804	$4,028	147	$7,547	$7,615	3,271	$2,301	$2,510	5,322	$2,984	$3,194
1931	2,357	4,213	4,268	219	9,049	8,499	4,028	2,526	2,804	6,604	3,345	3,515
1930	2,939	4,341	4,426	250	9,343	9,590	4,971	2,606	2,864	8,160	3,437	3,633
1929	3,418	4,344	4,428	297	9,417	9,515	6,120	2,649	2,937	9,835	3,442	3,654
1928	3,275	4,307	4,498	329	9,091	9,438	5,949	2,644	2,881	9,553	3,436	3,661
1927	3,224	4,338	4,313	308	9,061	8,047	5,403	2,609	2,826	8,935	3,455	3,543
1926	3,236	4,266	4,286	305	8,382	7,946	5,530	2,496	2,672	9,071	3,326	3,425
1925	3,096	4,184	4,177	287	8,474	8,384	5,203	2,490	2,635	8,586	3,301	3,383
1924	2,841	4,104	4,100	271	8,924	8,396	4,647	2,478	2,574	7,759	3,299	3,336
1923	3,014	4,014	3,983	250	8,527	7,831	4,969	2,363	2,510	8,233	3,154	3,211
1922	2,575	3,637	3,578	269	7,338	7,363	4,579	2,182	2,298	7,423	2,873	2,926
1921	2,187	3,557	3,421	220	7,253	7,556	3,659	2,168	2,271	6,066	2,853	2,877
1920	2,124	3,498	3,462	245	7,423	7,536	3,900	2,162	2,246	6,269	2,821	2,865
1919	2,245	3,204	3,145	329	6,140	6,089	4,386	2,058	2,079	6,960	2,621	2,612
1918	2,242	2,925	2,919	335	6,424	6,013	3,930	1,908	1,832	6,507	2,491	2,422
All Years	40,677	3,975	3,998	4,061	8,152	7,968	70,545	2,404	2,565	115,283	3,161	3,261

*Policy Year Data for the Following States:

California, Illinois, Indiana, Massachusetts, Michigan, Minnesota, New Jersey, New York, Texas, Wisconsin

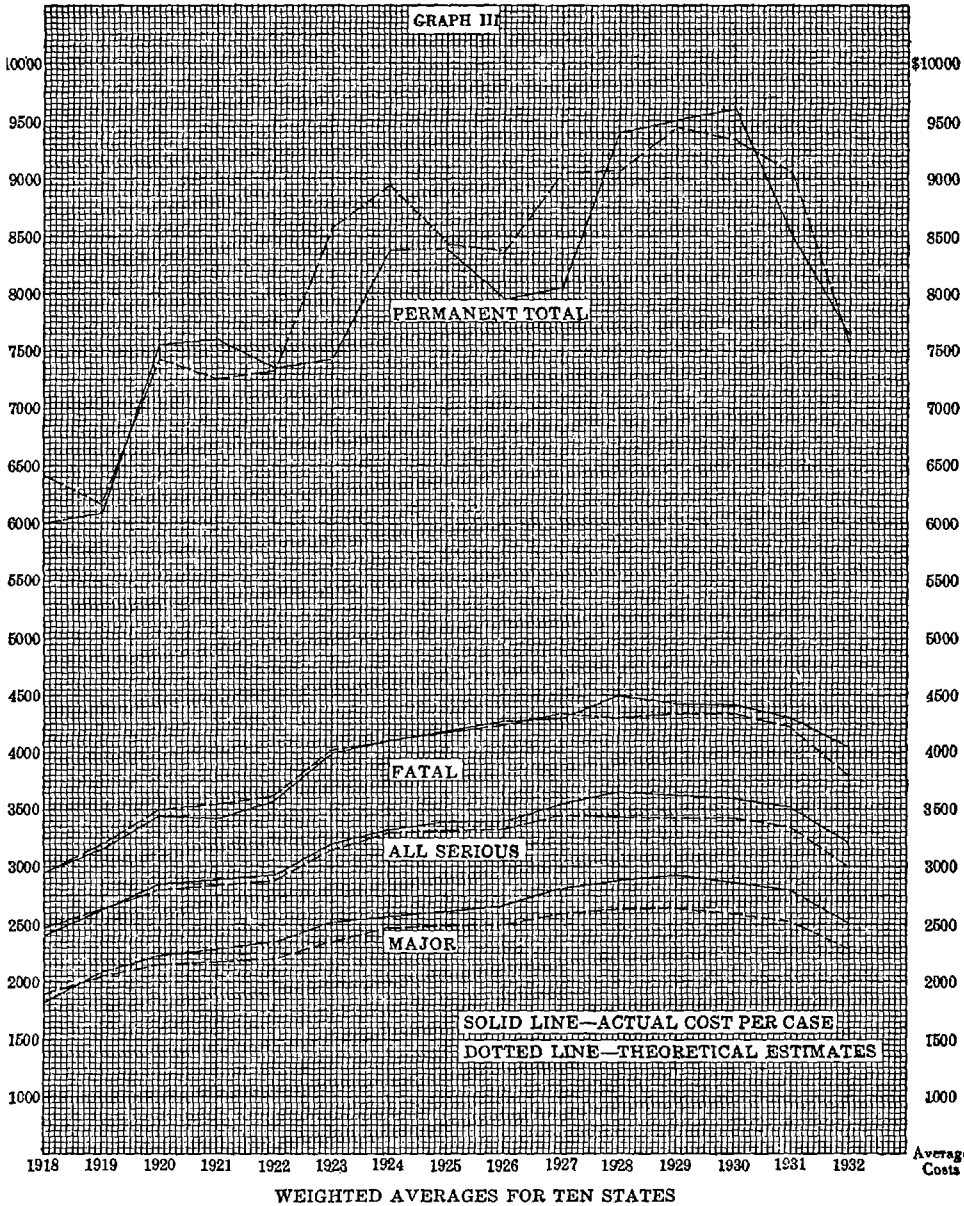
TABLE 16

EXHIBIT OF ESTIMATED THEORETICAL AVERAGES AND ACTUAL INCURRED AVERAGES
UNWEIGHTED ARITHMETIC AVERAGE FOR TEN STATES*

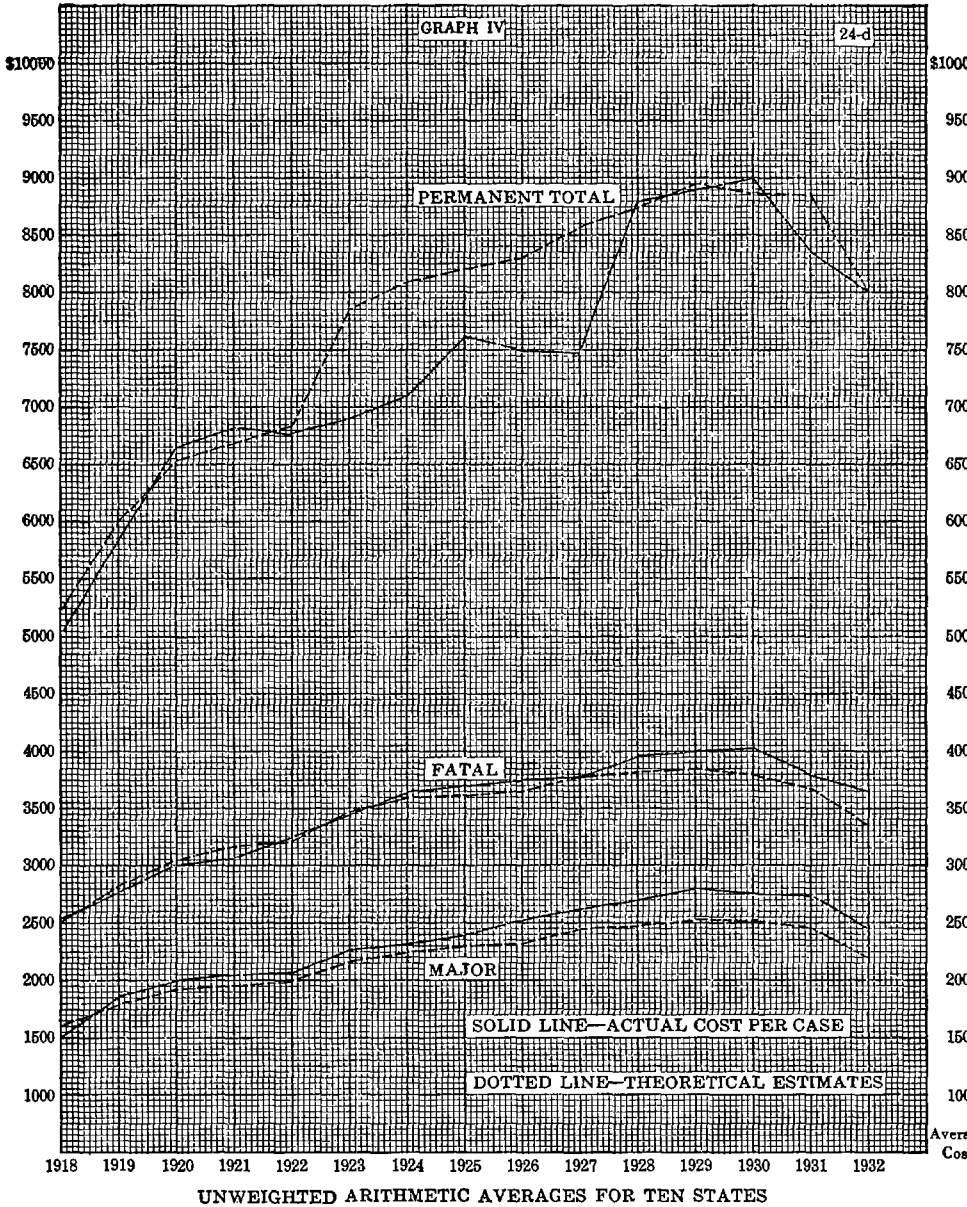
Year	Fatal			Permanent Total			Major		
	No. of Cases	Esti-mated Average	Actual Average	No. of Cases	Esti-mated Average	Actual Average	No. of Cases	Esti-mated Average	Actual Average
1932	1,904	$3,363	$3,663	147	$7,979	$8,019	3,271	$2,182	$2,480
1931	2,357	3,694	3,802	219	8,841	8,352	4,028	2,465	2,770
1930	2,939	3,821	4,022	250	8,894	8,968	4,971	2,509	2,743
1929	3,418	3,849	3,993	297	8,920	8,887	6,120	2,523	2,788
1928	3,275	3,832	3,954	329	8,786	8,788	5,949	2,484	2,705
1927	3,224	3,807	3,780	308	8,585	7,492	5,403	2,441	2,637
1926	3,236	3,664	3,740	305	8,276	7,482	5,530	2,348	2,532
1925	3,096	3,637	3,669	287	8,218	7,622	5,203	2,323	2,444
1924	2,841	3,588	3,632	271	8,112	7,143	4,647	2,286	2,341
1923	3,014	3,490	3,464	250	7,871	6,903	4,969	2,206	2,329
1922	2,575	3,237	3,232	269	6,845	6,809	4,579	2,045	2,090
1921	2,187	3,153	3,089	220	6,673	6,826	3,659	2,017	2,080
1920	2,124	3,056	3,025	245	6,547	6,668	3,900	1,972	2,023
1919	2,245	2,819	2,787	329	6,028	5,848	4,386	1,849	1,887
1918	2,242	2,536	2,569	335	5,172	5,068	3,930	1,607	1,543
All Years	40,677	3,436	3,495	4,061	7,716	7,392	70,545	2,217	2,360

*Policy Year Data for the Following States:

California, Illinois, Indiana, Massachusetts, Michigan, Minnesota, New Jersey, New York, Texas, Wisconsin



WEIGHTED AVERAGES FOR TEN STATES



UNWEIGHTED ARITHMETIC AVERAGES FOR TEN STATES