

**TRANSACTIONS OF SOCIETY OF ACTUARIES
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DIGEST OF INFORMAL DISCUSSION

MORTALITY STANDARDS FOR RESERVES

- A. Has the level and incidence by age of ordinary insurance mortality altered in such a way and to sufficient extent that consideration should be given to preparing a more up-to-date mortality table for reserve purposes?
- B. What problems are involved in constructing and securing statutory approval of annuity reserve tables with built-in mortality improvement factors?
- C. To what extent has the difference between the CSO Mortality Table and the current mortality assumptions in premium rate calculations caused difficulty by reason of statutory deficiency reserve requirements?
- D. What are the arguments for and against the adoption of a different actuarial basis for deficiency reserves, e.g. the minimum statutory reserve requirement?

MR. PEARCE SHEPHERD, discussing section A, stated that in studying this question the Prudential had prepared a table reflecting current mortality. A comparison of the ungraduated figures with the rates in Mr. Thompson's Table, *TASA XLII*, 325, is shown in Table 1, together

**TABLE 1
UNLOADED MORTALITY RATES PER THOUSAND**

Attained Age	(1) Ungraduated 1946-1952 Experience*	(2) Graduated 1930-1940† Experience	(3) (1) ÷ (2)	(4) Graduated 1946-1952 Experience‡
22	1.06	1.84	.58	0.96
32	1.18	2.38	.50	1.22
42	3.07	4.80	.64	3.07
52	8.6	11.7	.74	8.6
62	22.4	28.1	.80	22.2
72	52.5	63.7	.82	52.2
82	112.9	142.1	.79	115.5
92	252.9	329.6	.77	257.8

* 1946-1952 Standard Ordinary intercompany experience for all years of issue, for issue ages 10 and over, excluding war deaths and the first five durations and excluding nonmedical in policy years 6 to 15. The published age groupings were used without adjustment.

† Thompson's Table, *TASA XLII*, 325.

‡ Obtained from col. (1) by a graphic graduation of the ratios in col. (3).

er with the rates arrived at by a graphic graduation. This comparison shows an improvement of 50% at the younger ages, 36% at age 42, 26% at age 52, and a nearly level improvement of 20% at ages 62 to 92.

For purposes of comparison with CSO mortality, the graduated basic rates were loaded by $.05/\bar{e}_x$ to arrive at the rates shown in Table 2. The comparison of loaded rates shows less apparent improvement—markedly less at the younger ages and very slightly less at ages 42 and over.

They calculated net premiums and terminal reserves at $2\frac{1}{2}\%$ interest for three plans at ages 20, 35, and 50. The resulting Whole Life net premiums were 88 to 89 percent of the CSO net premiums at $2\frac{1}{2}\%$, the 20 Payment Life net premiums were 91 to 92 percent of the CSO, and the 20

TABLE 2
MORTALITY RATES PER THOUSAND
LOADED BY $.05/\bar{e}_x$

Attained Age	(1) Loaded Graduated 1946-1952 Experience	(2) CSO	(3) (1)+(2)
22.....	1.96	2.59	.76
32.....	2.46	3.92	.63
42.....	4.68	7.03	.67
52.....	10.8	14.3	.76
62.....	25.5	31.2	.82
72.....	57.6	69.7	.83
82.....	125.3	154.2	.81
92.....	282.0	323.6	.87

Year Endowment net premiums were 99% at the younger ages, ranging down to 95% at age 50. The Whole Life terminal reserves ranged from 91 to 97 percent of the CSO, 20 Pay Life ranged from 93 to 99 percent, and the 20 Year Endowment was 100 to 101 percent of the CSO. It is reasonable to assume that mean reserves for a normal distribution of business by age and plan would be approximately 4% lower than on the CSO table.

Reviewing the arguments which led to the adoption of the CSO table, Mr. Shepherd said:

1. Since the aggregate reserves would be less than those required by the use of the CSO Table, the result would probably be looked at askance by regulatory authorities when one recalls the concern about the possible safety of the American Men table as a valuation standard thirty years ago. It might be difficult to persuade the regulatory authorities that the modern table was safe even if actuaries were convinced it was desirable.
2. The calculations do not show that any serious inequities will result from continued use of nonforfeiture values based on CSO mortality. In other words, there is not at this time any serious problem with respect to nonforfeiture values such as existed when such values were based on American Experience

mortality. Whether any changes in the incidence of dividends by duration are required is a matter of judgment.

3. One of the reasons for wanting a more modern mortality table for life insurance calculations was the criticism aroused by the substantial "gains from mortality" brought out and even advertised in life insurance company statements. The public, misled as to the actual effect on cost of insurance by these figures, was greatly agitated. Similar figures if all expected deaths were calculated by the CSO Table would continue to be misleading. However, the statement form itself has made the production of such figures more difficult and has avoided advertising the ratio of actual to tabular mortality.

He concluded that there is no pressing need at this time for a new mortality table for valuation purposes.

MR. E. A. LEW stated that, on the basis of studies made in the Metropolitan, he agreed with the conclusions reached by Mr. Shepherd that the CSO Table was adequate. However, he had looked at the question from a somewhat different viewpoint. They wanted to find out the trend in natural reserves as a result of the improvement in mortality. To answer this they had computed reserves on the basis of successive dividend mortality tables they had used since 1940. A comparison of these natural reserves indicates that there has been a well marked tendency for them to become progressively smaller on the Life and long term Endowment plans at given durations.

They had also compared the CSO mortality rates with those based on the recent intercompany ultimate experience (as reported to the Committee on Mortality). A theoretical analysis of the differences between these mortality rates also points to the conclusion that the reserves on Life and long term Endowment plans calculated on recent intercompany ultimate experience would be smaller than those on the CSO Table.

He further called attention to the fact that the mortality observed at the very advanced ages reflected in large part the experience under policies paid up by their terms and that there was evidence indicating that the experience under premium-paying policies was somewhat higher than on paid-up policies. He expressed the opinion that reserves computed on recent ultimate experience on premium-paying policies would be closer to the CSO reserves.

MR. J. E. HOSKINS suggested that if reserves were computed on recent experience excluding the first five policy years but giving effect to duration from the sixth to the fifteenth years, thus producing a steeper curve of mortality than if mortality after five years were assumed to be independent of duration, then the resulting aggregate reserves might conceivably be as great as under the CSO Table.

MR. L. H. McVITY said the Equitable had made studies similar to those made by Mr. Shepherd and Mr. Lew, using the Equitable's dividend mortality table covering the period from 1945 to 1950 inclusive. He agreed that the results indicated there was no pressing need to adopt a new mortality table for reserve purposes.

MR. E. D. GIBB of the North American Life of Canada and MR. C. G. WHITE, Department of Insurance, Ottawa, Canada, discussed section B.

Both Mr. Gibb and Mr. White pointed out that the portions of the Canadian Federal Insurance Acts that relate to reserve bases require the actuary to choose an appropriate mortality table for the valuation of the class of policies with which he is concerned. In order to give a reasonable amount of freedom in making this choice and, at the same time, to retain some control over the mortality tables being used for annual valuations, the Acts contain lists of approved mortality tables.

However, the Acts also provide that if an actuary is convinced that none of the tables so listed is appropriate for the valuation of a certain class of policies, application may be made to the Superintendent of Insurance for approval of the table deemed most appropriate for the valuation. Such application must explain why none of the tables listed in the Acts is suitable for the valuation of the class of business concerned and why the table for which approval is requested is the most appropriate one available.

This provision enables the actuary making the valuation to use mortality tables derived from his company's own experience or from the pooled experience of several companies, even though such mortality tables may not be published and may not be in common use.

This approach to the problem of statutory approval of mortality tables for actuarial reserves worked with little or no difficulty until the advent of annuity mortality tables designed to allow for secular improvement in mortality.

Because the Superintendent of Insurance has the power to approve the use in valuation of a mortality table not listed in the Acts, it follows that he has the power to approve the use of a family of annuity mortality tables. However, Mr. White said it did not seem to be a reasonable interpretation of the insurance Acts to expect the Superintendent to approve a mere arithmetical tool that is not a mortality table but has been devised to produce reserves that make some allowance for improving mortality. Thus, most of the difficulties that the Department had encountered arose in trying to adapt the procedure that a company actuary wished to

follow so that it could be described in terms of a family of annuity mortality tables.

Mr. Gibb stated that during 1953 his company adopted premiums for immediate annuities based on *a*-1949 with projection B and premiums for group annuities based on *Ga*-1951 with projection C. The arithmetical work involved was naturally heavier than with the use of static tables but no serious problems were encountered. It was desirable to use groupings for years of birth, at the same time avoiding recessions in the rates from one year of age to the next. For premium rates this tends to limit the year of birth blocks to a maximum of 5 years. For reserve purposes, however, this consideration is not important and 10 year blocks produce satisfactory results. This basis of valuation was submitted to the Insurance Department for approval.

The conclusion reached during 1954 by the Department was that minor departures from published tables and projection factors, grouping of years of birth and other variations were of the same nature as valuation approximations. With this approach the Superintendent's approval of the complete family of tables could be secured in the form of a reference to the published table and projection scale. The justification of any deviations adopted in the valuation procedure becomes the responsibility of the company's actuary and the results produced are subject to the scrutiny of the Department of Insurance.

MR. L. H. McVITY stated that while the Equitable had not attempted to secure statutory approval of annuity reserve tables with projection factors, they had recently submitted their new ELAS table and the New York Insurance Department had required that they make a double valuation at the end of 1954 to prove that in the aggregate the reserves on the ELAS table were greater than according to New York minimum standard of valuation for annuities, namely, the 1937 Standard Annuity Table at 3% interest. It appeared they would have to make a double valuation periodically, unless the New York Law were changed to permit more modern mortality tables to be used for valuation. He made a plea that the industry attempt to get the laws of various states changed so as to permit more modern reserve standards.

MR. W. C. BROWN, discussing sections C and D, felt that the problems caused by the statutory deficiency reserve requirements were becoming increasingly serious in his company, the Colonial Life, and that these problems will increase for those companies writing nonparticipating business until either the deficiency reserve laws are changed or a new mortality table is approved for valuation purposes. If only the latter event oc-

curs, deficiency reserve problems will recur periodically in the future. The difference between the CSO mortality table and current mortality assumptions in premium rates is not the sole cause of difficulty. The problem is accentuated in connection with plans of insurance with a large average policy and, therefore, substantially reduced expense rates per \$1,000. For one such plan issued by his company, the deficiency reserve required for 1954 issues was almost nine times the normal reserve and the latter was calculated on a basis considerably more conservative than the legal minimum.

The accompanying table compares, for decennial ages, the ultimate mortality rates assumed in their current Ordinary premiums with those assumed in their premiums established in 1943, shortly after the CSO Table was produced, and with those in the CSO Table. Their actual ex-

Age	1943 Mortality Assumption as % of CSO	1953 Mortality Assumption as % of CSO	1953 Mortality Assumption as % of 1943 Assumption
20.....	92%	42%	45%
30.....	71	37	51
40.....	73	41	57
50.....	82	61	75
60.....	88	79	90

perience currently is 70% of the rates in column 2. Considering that the CSO Table was intended to include a modest allowance for contingencies, over actual mortality experience, the comparison of that table with the 1943 mortality assumption seemed quite reasonable. However, it is obvious that the substantial improvement in mortality assumptions from 1943 to those in current use have resulted in the current figures being way out of line with CSO mortality. Obviously, reserves calculated on the CSO Table provide for much higher mortality than do current premiums and it is imperative that a start be made toward correcting this situation.

With respect to section D, he wished to argue for the elimination of the deficiency reserve statutes instead of proposing a different actuarial basis. Certainly, if deficiency reserves were based on the minimum statutory reserve requirement, the problem for the companies concerned would be reduced. However, under modern conditions, he failed to see the necessity for the deficiency reserve provisions. Presumably, these statutes were enacted many years ago in order to protect life insurance companies from the consequences of their own acts if they wished to reduce premiums

below a safe level. Such a statutory limitation is not needed as long as there is capable supervision such as now exists from the various state authorities. In addition, Section 213, Paragraph 10, of the New York Law would prevent any company operating in that state from issuing a contract which would not appear to be self-supporting on reasonable assumptions as to interest, mortality and expense. The principle of legal reserves is, of necessity, rather artificial through the use of very conservative interest and mortality assumptions. No one can tell in advance what the true mortality and interest results will be, and the true reserves are probably quite different from the actual reserves held. He would agree that reserve assumptions must be conservative, but felt that the deficiency reserve requirements are an extra unnecessary penalty and should be repealed.

The existing deficiency reserve statutes introduce an important discriminatory element as between participating and nonparticipating insurance. There is no restriction on the level to which the cost of insurance under participating insurance can be reduced through dividends. But there is a definite limit in the case of nonparticipating policies unless the nonparticipating company can afford the luxury of putting up deficiency reserves.

MR. G. H. DAVIS stated that it seemed to him there was no sound argument for any requirement for deficiency reserves. The argument usually advanced confuses gross premium and net premium valuation. In a gross premium valuation the company's reserve is the present value of future benefits minus the present value of future gross premiums less anticipated actual expenses. On this basis, there cannot be a deficiency reserve because a net premium does not enter anywhere into the calculation.

A net premium reserve is the present value of future benefits minus the present value of future net premiums. The deficiency reserve argument states that it is improper to deduct the total present value of net premiums if the gross premiums actually to be collected are less than those net premiums.

This reasoning he regarded as fallacious because it is not sound to consider the present value of the future net premiums by itself. The net premium can be more than the gross only if the mortality or interest basis, or both, are very conservative. If this is the case, the present value of the benefits will be greatly overstated, and this overstatement will more than offset the overstatement in the present value of future premiums.

He felt, however, that as a practical matter it would be almost impossible to get all the various states involved to change their laws so as to eliminate the deficiency reserve requirement.

MR. J. E. HOSKINS felt there might be merit if the standard deficiency reserve statute used by many states were to be so worded that the deficiency reserve had to be calculated on the basis of the minimum reserve standard required by the state rather than on the valuation table used by the company for calculation of its reserves. Under the current law, if the company had a relatively small deficiency reserve according to one basis of valuation and wished to change its regular reserves to a stronger basis, it would have to strengthen not only its basic reserve but also the deficiency reserve and this latter could amount to a very large sum. If a company had available only a certain amount for reserve strengthening, it might have to change to a reserve basis less conservative than the one it really desired and this could be expensive because of the tables at odd interest rates that might have to be computed.

If the choice of reserve basis were made when first starting to issue a block of business, the deficiency reserve might far outweigh the initial differences in basic reserves and would tend to discourage the adoption of the more conservative basis.

It is true that net premium valuation assumes that at least the net premium will be received in each subsequent policy year of the premium period, and this assumption may justify the requirement of a deficiency reserve in connection with the minimum valuation permitted by the state. If the company voluntarily reserves, however, on a more stringent basis than the minimum, the only concern of the state about gross premiums for purposes of valuation is that the company shall receive enough premium to maintain the minimum reserve if, under some unlikely circumstances, it should be forced to fall back on the minimum reserve.

If a gross premium valuation of a company should indicate that a reserve on a basis stronger than the minimum, but without deficiency reserve, is inadequate, then of course sound actuarial practice would require a larger reserve to be maintained. This would be equivalent to saying that the minimum reserve appropriate for this particular company is greater than the minimum reserve prescribed by law. If, however, a stricter reserve basis than the legal minimum is a matter of conservatism rather than of urgency, it should not have to be accompanied by an artificial deficiency reserve.

MR. G. L. HOLMES said that when the Manufacturers Life recently reduced gross premiums on one of their plans because of improving mortality, they were faced with a problem of a large increase in deficiency reserves. Their reserves had been calculated at $2\frac{1}{2}\%$ interest. However, their nonforfeiture values were based on 3% interest. They, therefore, changed the reserve basis to a 3% interest assumption. Since they felt,

however, that reserves on this basis were not conservative enough, they set aside an additional amount, but not as much as would have been required if they had stayed on a $2\frac{1}{2}\%$ basis and set up deficiency reserves. He said it was too bad that instead of mathematics being a tool, it was becoming the master.

MR. A. N. GUERTIN, American Life Convention, stated that deficiency reserve requirements had existed by statute or practice for a great many years in many states. One or two states even specified that the gross premium should not be less than the net premium. When the Committee drafting the Standard Nonforfeiture and Valuation Laws considered the problem, it was faced with an existing requirement which would have been quite difficult to remove from the statutes. Considerable study was given to the problem, and suggestions for changing its form were made, but the end result was a continuance in the standard legislation of substantially the form of deficiency reserve then in existence in the various states.

The Committees of the American Life Convention and the Association of Life Insurance Presidents had suggested a modification in the form of deficiency reserve statute first suggested by the Commissioners' Committee. The conclusion from their report was as follows:

We recognize, however, that in some circumstances deficiency reserves should be carried. For example, if a company states that it is carrying reserves for a certain group of policies on a particular basis and yet is charging gross premiums less than the net premiums on that basis for some of these policies, it should properly be carrying deficiency reserves in addition to the other reserves implied by that basis. . . .

The above proposal was implemented by a proposed provision that no life insurance company should represent that reserves on any group of policies or contracts had been calculated upon a particular standard unless it took account of deficiency reserves where the gross premium was less than the net premium.

The Committee that framed the standard legislation was faced with the problem of whether it should attempt to have deficiency reserve requirements eliminated from the laws of a great many states, whether the laws should be reworded so as to make them as innocuous as possible, without losing the substantially protective features which they theoretically provide, or whether the existing requirements should be continued.

In theory, a deficiency reserve is merely an adjustment which is brought about by unrealistic actuarial assumptions. Regardless of the basis of valuation adopted by any company, be it preliminary term, net level, commissioners' reserve or any other basis, the putting up of a de-

iciency reserve is merely a device by which the reserve is never permitted to be based on a prospective premium which it is known will never be collected.

Bearing in mind the above theoretical considerations, it seemed to him impractical for the life insurance business to proceed with a program of legislation in more than forty states with the object of eliminating a legal requirement of this sound theoretical nature, designed for the safety of policyholders, because the program as a whole would be a failure if it failed in one jurisdiction.

Mr. Guertin thought the basic reason the deficiency reserve requirement embarrasses companies charging adequate premiums is that the CSO Table, based on the mortality experience of 1930 to 1940, is no longer representative of current mortality, which has shown such tremendous improvement in the last fifteen years. Such improvement was not unforeseen. In the report of the Commissioners' Committee on nonforfeiture benefits, the original draft of the valuation and nonforfeiture laws provided for the approval of "appropriate" mortality tables and established machinery whereby revision would take place from time to time without amendment to the laws of the several states. The industry committees, however, opposed such a provision and, instead of approving the recommendation that the CSO Table be recognized by statute initially as an "approved" table, recommended that the CSO Table be written into the statute as the "standard" table.

The Commissioners' Committee, however, had already decided that if revision of tables were ever to be necessary, the way should be paved for making it as simple as possible. Among the implementations to such possible revision was the choice of title of the table developed. This is the main reason why the table was called "Commissioners 1941 Standard Ordinary Mortality Table." It was recognized by the members of the Committee that it would be relatively easy either administratively or legislatively to have recognition given to, say, the "Commissioners 1960 Standard Ordinary Mortality Table" on the mere representation that mortality had improved and the insurance companies and Commissioners were desirous of bringing the mortality table used up to date. He felt that the statutory recognition of a new table under these conditions would pass any Legislature in which it was introduced, without the slightest opposition from anyone. Legislation in *all* states might have some chance of accomplishment. In his opinion, elimination of deficiency reserves in *all* states would have no chance at all from a practical standpoint.

The building of a new mortality table under modern conditions is not an insurmountable task. The basic elements are already at hand in the

statistical material published by the Society of Actuaries in the same form and covering the same areas as those which were used in the compilation of the CSO Table. The job of preparing monetary tables similar to those which were prepared in 1947 by the Society of Actuaries could now, because of that experience, be carried out at relatively small cost. He thought the public relations effect of such an undertaking well worth the effort and the cost.

Of course, there would be great resistance on the part of many people to this suggestion because of the work involved. Others have raised the point that it might be possible to amend the deficiency reserve statute by specifying therein a particular mortality basis representative of present trends or to provide that the Insurance Commissioner could specify a table by administrative fiat. How practical this is, he did not know. He had a very definite feeling, however, that it would defer for a long time to come periodical modernization of mortality tables. In his opinion this would not be desirable. Revision of tables from time to time could only redound to the credit of the business and in good public relations. Again, if legislation on this score should fail in any *one* state, the program as a whole would be a failure. It probably could not be carried out within any short term of years in any case, and the solution could be long deferred. In his opinion this third approach has all the disabilities of an attempt to repeal the deficiency reserve provisions and is, in fact, a make-shift approach to the problem.

Another school of thought, to which Mr. Guertin does not necessarily belong, is of the opinion that deficiency reserves have served a very substantial function in the life insurance business and may even constitute our best protection against rate regulation. Deficiency reserves approach the problem of rates in a very indirect way, and one with respect to which there are no administrative duties in the rate field by regulatory authorities. Officers of some small companies have attributed to the deficiency reserve requirement the retention to them of some vestige of a competitive position and would be reluctant to see them eliminated. While he could not say whether the current trends in rate competition would be aggravated by a change in the existing situation, nevertheless these points would probably be considered by some people in connection with this whole problem.

MR. G. H. AMERMAN stated he agreed with previous speakers that it was not practical to attempt to have the deficiency reserve statute requirement repealed. He felt there was a grave danger in attempting to have a new mortality table substituted, because it would be very difficult to operate if some of the states had adopted the new table and others had

not, and referred to experience the companies had in the past at the time the CSO Table was being adopted.

He favored the suggestion of basing the deficiency reserve calculation on the minimum reserve standard regardless of the valuation basis used by the company for its regular reserves. If a law to permit this fails of enactment in some states, companies will be no worse off than at present. He stated that there was one other possible approach, namely to base the deficiency reserve test on net premiums according to the Jones' Basic CSO Table rather than the CSO Table. It will be recalled that Jones' table was obtained by removing the contingency margin from the CSO mortality rates and represents in effect an experience table which produces approximately the same regular reserves as the CSO Table.

MR. RALPH KEFFER said that according to basic actuarial principles the deficiency reserve statute should be considered jointly with the regular valuation statute, rather than by itself, when analyzing its effect. It is evident that, when the law considers adequacy of reserves, it requires a prospective valuation, that is, the reserve must be equal to the excess of the present value of the benefits which the company is obligated to pay in the future over the present value of the amounts which can be taken as credits out of premiums to be collected in the future. Under the net level premium basis these future credits are limited to the net level premiums. Under the various preliminary term methods it is assumed that under certain conditions such credits may be somewhat greater than net level premiums. In no event, however, should those future credits be greater than the gross premiums which will be collected. He thought this to be a perfectly logical requirement and that a company should not be permitted to say it reserves according to a certain mortality and interest valuation basis if the net premiums used are greater than the gross premiums it will collect.

Moreover, he stated that if the statute were changed so as to permit the calculation of deficiency reserves to be made by the minimum standard regardless of the actual standard used by a company for regular reserves, the two reserves taken together would not be consistent because based on two different interest rates; and the company could not truthfully say it was reserving according to any particular valuation basis.

He felt that the so-called relief which some companies need can be accomplished only by a change in the valuation mortality table. If relief is needed, it must be because the valuation mortality basis requires higher reserves than are needed according to modern mortality experience. If that is the case, the means of getting credit for such experience is an en-

tirely different problem from the elimination of requirements for deficiency reserves.

CHAIRMAN W. A. ANDERSON stated that the interpretation of section D that had been made at the meeting was slightly different from that made by those who had framed it. The question had been meant to be to the effect that the law might be changed so that the minimum valuation standard of the state would be the sum of regular reserves according to the minimum standard and of deficiency reserves calculated by measuring gross premiums against the net premiums for the minimum standard. The total of these two reserves would be regarded as the minimum reserve. Any company whose actual reserves were greater than such minimum reserve would be considered to have satisfied the minimum standard required by the state without having to calculate deficiency reserves as such.

MR. HOSKINS agreed that it might be preferable to eliminate the requirement of deficiency reserve if the basic reserve is figured on a standard higher than the minimum and exceeds the sum of basic and deficiency reserves on the minimum basis.