

VALUATION

- A. When a company uses an attained age valuation system, is it the common practice to continue to maintain records by plan, year of issue and age for statistical purposes, and in order to locate maturities, policies becoming paid-up, expiring terms, etc.?
- B. Are the advantages of the attained age system in reducing the number of valuation groups sufficient to offset the additional work required in calculating reserve correction factors and the necessary separation of totals required for those policies which cannot conveniently be included in the attained age system?
- C. Have any companies recently changed their general method of valuation, and, if so, for what reasons?

MR. C. E. WEST noted that the number of subdivisions for attained age valuation had been multiplied by reason of the introduction of different interest rates and the use of the CSO mortality table.

In the Provident Mutual it had been found necessary to value separately policies involving varying death benefits. Also, the reserves on the annuity portion of continuous income and survivorship income policies, on substandard business, disability and double indemnity, were calculated by special methods. However, this would probably be true in any system of valuation, he observed.

He pointed out that the attained age method lends itself easily to the calculation of the expected net mortality as a check on the gain and loss "tabular cost." For policy year mortality and certain other statistical studies it was convenient to maintain summary cards by age groups, years of issue and plans, these cards being reconciled periodically with the summary cards maintained by attained age only.

As for actual valuation work, he said no attempt was made to obtain a reserve total on insurance before the end of the year. The attained age summary cards were brought up-to-date immediately after the close of business and the various extensions were made on the multiplying punch. In the meantime reserve calculations on special plans were being made so that the entire reserve valuation was completed shortly after the end of the year. Thus the work was arranged so as to involve a minimum amount of overtime and a maximum use of mechanical means.

MR. J. S. ELSTON said that in his company a duplicate valuation file was maintained in valuation order, *i.e.*, by rate of interest, valuation key and office year of birth, with each group subdivided by transfer year, under each of which divisions the cards were in numerical order. Thus, for

instance, all the 20 year endowments issued at the same age were filed together and endowments maturing at certain ages, as for instance at 65, were all in one year of birth group. This file was used to locate maturities, policies becoming paid-up, expiring terms, etc.

The duplicate set of valuation cards had proved very useful in The Travelers in two other respects. In the case of new issues it was used for part of the monthly records, of which there were about 25, such as control by year of issue and insurance by states. The duplicate set was also used in reconciling the company valuations with independent reserve calculations made by the Connecticut Insurance Department.

The Travelers maintained records of insurance by plan, year and age of issue but these were all derived from the mortality cards, the first 52 columns of which were duplicated from the valuation card. From these cards, a rather elaborate analysis of new business paid for was made by plan and age, their only other uses being analyses by year and age at issue used in the disability clause, the additional indemnity provision, the fractional premium waiver and the gross premium valuations. The tabulations in the latter case were by plan and age at issue, though in general only three or four of the principal forms were used in determining the appropriate modification of the regular reserve. In each of the other cases all policy forms were thrown into about half a dozen groups which had approximately similar characteristics and valuation was made by quinquennial age groups.

He explained that in his company some methods were adopted to enable them in certain classifications to use the attained age valuation system approximately. For instance, joint two-lives factors were used on a joint three-lives case in such a way as to give essentially the same reserve. At juvenile ages the factors themselves were modified so as to give correct reserves. Approximate factors were used on continuous installment extras which means a separate tabulation of policies with this feature by year of issue.

All of their policies under each interest rate were divided into ten keys: single-life standard life, endowment and term; single-life substandard life, endowment and term; and joint two-lives life, endowment and term. The tenth key was for forms like retirement income where the reserve was greater than the original face amount. The valuation method for this group of policies was described in *TSA I*, 529. He intimated that perhaps these groupings avoided some of the adjustments suggested in section B of the question.

He thought there was no doubt but that the advantages of the attained age system offset the additional preliminary work required. In this con-

nection, he explained that under their valuation system involving three valuation rates of interest they had a file of master cards which was reduced to about 2,000 on the "in force" as of January 1, and a valuation was made from these as of the next December 31. For their monthly statements they estimated the reserve monthly, but actual calculations were made at the end of six months, nine months and the year. After the six months' valuation was made, this part of the file was reduced to master cards and similarly for the other periods. The final reserve was obtained by assembling the results of these separate valuations. As a final check for the year's work all of the then master cards, amounting to about 25,000, were tabulated and the reserve reworked in about 15 hours, with a comparable amount of time for checking.

It had not proved feasible to work by the attained age method reserves for dividend and other paid additions, return premium factors, some excess single premium juvenile and extended term juvenile, and a very few items arising from very old contracts. He observed that return premium features and the family income benefits could be valued by the attained age method if there were room on the punched card for the extra factors, but this did not seem worth while in their case.

MR. J. H. BRADDOCK discussed valuation by the group method and emphasized the ease with which the valuation in-force could be obtained by this method. In the New York Life, the insurance in force is summarized in valuation groups as of November 30 for the purpose of estimating the dividend liability and to insure that the summary cards are in balance with the insurance account, but the valuation is now being made only as of December 31.

MR. W. W. STEFFEN said that the attained age method of valuation had been used by the Lincoln National since 1928 and had proved very satisfactory. They felt that the advantages of the attained age method outweighed the additional work required to compute the valuation constants and to secure the reserve liability on policies to which the method was not adaptable and which were therefore valued seriatim.

To combine the results with the attained age valuation, the seriatim method employed in his company involved the use of two punched cards for each policy, he said. The first card was punched on the regular attained age card form with all fields punched except the valuation constant and the valuation group coding field. A second card contained the same identifying information and in addition had six terminal reserves punched in it. Control punching was provided in both cards so that the two card files could be combined and tabulated as a single group to obtain all the necessary valuation information by running the cards just once.

He also mentioned that several permanent summary card files were maintained in conjunction with the attained age valuation files. These files were established several years ago from the individual cards, summarizing the appropriate information as required for the special report made from each file. These summary cards served as the calculation cards for the actual reserve calculations, which were performed on a multiplying punch.

He enumerated eight reports which were prepared by means of summary cards: (1) the reserve liability for page 5 of the convention blank, (2) the ratio of the total gross premium to the total net premium, for use in obtaining the net premium from the premium accounts, (3) the computation of special revaluation reserves, (4) the reserve liability for policies issued in certain states, such as Indiana, Massachusetts, Mississippi, Montana, Oklahoma and Texas, and also the Philippine Republic, (5) the net level premium reserves for Federal income tax purposes, (6) the statement reserve liability split by method of valuation as required on page 8 of the convention blank, (7) state exhibit figures for page 10 of the convention blank, (8) the exposed to risk for the computation of the expected mortality for an annual mortality investigation.

One objection to the attained age method of valuation, he observed, was that the valuation tabulations did not provide data in convenient form for use in making mortality investigations. Recently it had been decided in his company to prepare the annual mortality investigation from a separate mortality card which was maintained for their other specialized mortality investigations.

He stated that the transfer year on the valuation detail cards, together with a code describing the purpose of the transfer year, was used to sort out policies maturing, expiring or becoming paid-up, policies with a change in premium or amount, and policies with special options expiring in a given year.

MR. H. L. FEAY discussed the subject of valuation methods from the standpoint of insurance department supervision, with particular reference to New York, where the department checks all the extensions and summaries involved in the valuation schedules of the domestic companies.

He indicated that all of the larger companies in New York used the group method. Of the smaller companies five used the seriatim method and one used the attained age method. As the latter was the last to file its data with the department, he concluded that the attained age method did not save time. Also, he pointed out, under the attained age procedure the insurance department had the problem of checking the valuation constants.

With the modern multiplying and calculating punches available, he

said the seriatim valuations no longer presented the enormous task that they did in years past when the extensions for each policy were made by hand.

MR. J. C. DAVIDSON said that the Confederation Life Association was giving serious consideration to changing from the attained age valuation method to either the group or seriatim method or a combination of the two. The Association, he said, operated in 23 countries, and in order to meet all statement requirements it was necessary to break down the total reserve figure into roughly 500 groups. This resulted in approximately 12,000 summary cards to which attained age factors must be applied but this could be done in one run through the calculating punch. Odd plans which did not fit into the attained age method were handled separately and manually key-punched.

The special operations required by the attained age method, he mentioned, were the insertion of the valuation constant, the net premium, and the valuation year of birth on each valuation detail card. In order to check the accuracy of this information, runs of the new detail cards were made periodically and a terminal reserve calculated for year zero.

He estimated that a group valuation of the Association's 300,000 policies would result in about two and one-half times the present machine time. To compensate for this additional work, however, the special operations mentioned for the attained age method would be eliminated and the resultant summary cards obtained as a by-product would provide much statistical data which the attained age method would not normally produce, such as insurance in force by plan and year of issue. The lack of such information, he said, was a serious handicap to the actuarial research department when considering matters of expenses and mortality for premium rates. Also, under the attained age method it was difficult to follow any shifts in business in force by plan and age and the effect of initial selection and of substandard business was concealed.

MR. R. H. NILES enumerated four reasons why the Standard changed several years ago to the attained age method of valuation: (1) to eliminate peak loads, (2) to make fuller use of machines and cut down clerical work, (3) to make mortality studies more quickly and easily available, (4) to simplify and improve control of reserves. One of the important advantages has been the almost complete mechanization of the valuation procedures, resulting in reduced costs as well as in more adequate controls and greater accuracy.

In his company, he said, it had been found possible to value all forms of policies by the attained age formula. The family income type policies

were valued by modifying the amount of insurance and by introducing in addition to the premium and valuation constant a fourth factor, *i.e.*, a reserve correction factor.

Income endowment policies in those cases where the reserves exceed the face amount were valued by a formula of the type $A \times B - C \times D$. This is the same form as two of the terms of the attained age formula. He pointed out that the factors must be on a basis involving interest only and that the year of maturity must replace the office year of birth. From there on, he indicated, those policies could be handled by the same general procedures.

MR. H. M. SARASON observed that technical "know-how" seemed to get only part of the way around via the "grapevine." Hence, he was "rushing" into print about twenty or thirty years late with several elementary bits of technical "know-how."

1. Generally, two columns of a valuation card were available to indicate the next calendar year in which the policy would require special handling, *i.e.*, the year premium changed, the year of expiry or maturity, etc. Thus, under the attained age valuation method or any other valuation method the valuation file could be used as a source for predetermined changes in policy status. A collator, or a selective sorting device, could be used to choose the proper cards from the file without disturbing the order of the file.

2. Summary cards produced on a summary punch as the file was being tabulated could be used to combine separate totals from one or more valuation files whenever desired. Also, punched cards for several different valuation methods used in the same company might show amount of insurance, amount of premium, etc., in the same fields so that individual valuation cards could be tabulated for several valuation methods together for various purposes.

3. Running accounts could be used for statistical purposes to produce from an attained age file whatever information would be available by the group valuation method, except reserves. Even the reserves could be calculated in groups by the attained age method very rapidly.

Comparing the two methods of valuation, he made the observation that the advantage of the attained age method over the group method was decreasing with increasing efficiency in multiplying on punched cards. However, as he pointed out, the group method did involve considerable matching of reserve factors with amounts of insurance and under the attained age method this matching was minimized. Also, by the group method, if the file were maintained in valuation order the notices of current transac-

tions would have to be sorted into more subdivisions than by the attained age method, and if the file were not maintained in valuation order then the sorting of the file into valuation order would be more troublesome under the group method than under the attained age method.

He emphasized that the important thing was to get as much of the valuation and related work as possible out of the way before the last two months of the year. The percentage which could be handled ahead of time would vary very little with valuation method, in his opinion. The next most important consideration was coordination between valuation work and other policy record keeping so that the final information could be produced and the labeling of records of transactions could be handled efficiently.