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ADJUSTABLE LIFE POLICIES ON A RATED BASIS

JOHN E. ASCHENBRENNER

ABSTRACT

Adjustable life has been described as possibly the only or the last life insurance policy that an individual will ever need. To meet this expectation, companies must be able to issue adjustable life on a rated or nonstandard basis, and also to combine varying ratings within a single policy. This paper discusses two different methods of handling ratings under adjustable life and compares the advantages and disadvantages of each. The first method modifies the cash value and dividend mortality rates used in calculations on rated policies. The second method follows the more traditional approach of charging an extra premium but using standard cash values and dividends. For both methods, this paper also illustrates how varying ratings can be accommodated in a single adjustable life policy.

I. INTRODUCTION AND NOTATION

THE flexibility of adjustable life offers some unique opportunities for handling the coverage of rated mortality classes. Within this context, however, it also raises some new and difficult questions. This paper builds on the basic adjustable life mechanics presented in Walter L. Chapin's paper "Toward Adjustable Individual Life Policies," *TSA*, XXVIII, 237. It expands on Mr. Chapin's brief discussion of rated policies and discusses various ways to encompass rated policies and rated portions of a policy. A knowledge of adjustable life is assumed, so the basic concepts and formulas from Mr. Chapin's paper are not repeated in this paper.

Reserves and cash values are assumed to be equal and are based on the Commissioners Reserve Valuation Method (CRVM).

The following notation from Mr. Chapin's paper is used:

- m = Designation of status of a policy ($m = 1$ is the status for an original issue, $m = 2$ is the status after the first change, etc.);
- x_m = Age of insured at the beginning of mth status;
- z = Age at expiry of a term policy or age at maturity of an endowment policy;
- w = Age to which premiums are paid on a limited payment whole life or endowment policy;

k = Ratio of a unit of maturity value to a unit of insurance ($k = 0$ applies to term insurance, $k = 1$ to endowment insurance, $k > 1$ to income endowment insurance maturing for k per unit of insurance, and $0 < k < 1$ to partial endowment insurance maturing for k per unit of insurance);

I_{x_m} = Amount of insurance in effect during mth status;

$I_{x_m}\pi_{x_m}$ = CRVM net premium during mth status;

$_{\overline{x_m - x_1}}V_{x_1}$ = Terminal reserve at commencement of mth status;

$_{\overline{y - x_1}}V_{x_1}$ = Terminal reserve at attained age y;

$I_{x_m}\Delta_{x_m}$ = Allowance for statutory expense in the first year of status m.

II. INTERNAL METHOD

Rated coverage under adjustable life can be handled by modifying the cash value and, in the case of participating policies, dividend mortality rates to reflect the extra mortality associated with the particular rating. Normal premium, plan, cash-value, and dividend calculations then could proceed using these modified mortality rates in place of the standard rates.

Since this method affects all the inner calculations—cash values, plan, premium, and dividends—it has been called here the internal method.

Guaranteed Values

As mentioned above, the gross premium, plan of insurance, and cash values all would be affected by this method. In a percentage-extra class, a level multiple of the standard-cash-value mortality table could be used at each age. Alternatively, a nonlevel multiple might be used if that fits the expected pattern of extra mortality more closely, or a percentage of experience mortality could be added to the standard-cash-value mortality.

If a nonlevel multiple is used, care must be taken that mortality rates never decrease by duration, because, if they do, the normal progression of plans and premiums is disrupted and there is no longer a unique plan of insurance for each combination of premium and face amount. For example, if mortality rates were to peak at attained age 65 and then begin to decrease, the premium for term to age 64 might be identical with that for term to age 67, with term to age 65 and term to age 66 having higher premiums than either of the other two. In addition, mortality rates that decrease by duration can cause negative cash values.

Flat-extra classes can be handled by the addition of a level amount of extra mortality (such as ten extra deaths per 1,000) to the standard rates at each age. The problem of decreasing mortality rates is even more troublesome here because of the large decrease that can occur at the end of a temporary flat-extra period.

This problem may be illustrated by a \$1,000 ten-year term policy issued to a male aged 25. The modified net premium under the CRVM is \$2.08, based on the Commissioners 1958 Standard Ordinary Mortality Table (1958 CSO) and 3 percent interest. The expense allowance is \$0.20, and the first- and second-year cash values are \$0.00 and \$0.18, respectively.

Assume that the policy has a rating of ten extra deaths per 1,000 for one year. Using formula (6) of the Chapin paper, the CRVM net premium can be calculated as

$$I_{x_1}\pi_{x_1} = I_{x_1}\frac{(M_{x_1+1} - M_z)}{(N_{x_1+1} - N_w)} .$$

By Chapin's formula (3), the expense allowance is given by $I_{x_1}\Delta_{x_1} = I_{x_1}(\pi_{x_1} - c_{x_1})$. Since c_{x_1} is greater than π_{x_1}, this results in an expense allowance of $-$\$9.51. Therefore, $I_{x_1}\Delta_{x_1}$ is taken as zero, and the modified net premium $(I_{x_1}\pi_{x_1})$ on the rated policy is recalculated by using formula (8) of the Chapin paper:

$$I_{x_1}\pi_{x_1} = I_{x_1}\frac{(M_{x_1} - M_z)}{(N_{x_1} - N_w)} = \$3.18 .$$

The first- and second-year cash values are $-$\$8.76 and $-$\$7.73, respectively.

The cost of this rating to the policyholder should be approximately \$10.00. However, for a policyholder terminating at the end of the first year, the cost (on a net premium basis) is the excess of the \$3.18 premium on the rated policy over the \$2.08 standard premium—only \$1.10. There is no loss in cash value. The policyholder terminating after two years has paid an extra premium of \$1.10 for two years and loses \$0.18 of cash value. Because of the decreasing mortality rates and the resulting negative cash values, the policy must persist for almost its full ten-year period before it bears the full cost of the rating.

The approach in the Chapin paper seems to fall within the spirit of the Standard Valuation Law. Technically, however, the method outlined in the law will produce somewhat different results when $\pi_{x_1} < c_{x_1}$. The law defines the modified net premium as

$$\pi_{x_1}\ddot{a}_{x_1:\overline{w-x_1}|} = A_{x_1:\overline{z-x_1}|} + (a - b) ,$$

where

$a =$ A net level annual premium equal to the present value, at the date of issue, of such benefits provided for after the first policy year, divided by the present value, at the date of issue, of an annuity of

1 per annum payable on the first and each subsequent anniversary of such policy on which a premium falls due—provided, however, that such net level annual premium shall not exceed the net level annual premium on the nineteen-year premium whole life plan for insurance of the same amount at an age one year higher than the age at issue of such policy;

b = A net one-year term premium for such benefits provided for in the first policy year.

When $\pi_{x_1} < c_{x_1}$, a strict interpretation of the Standard Valuation Law implies a negative expense allowance, resulting in a zero reserve at the end of the first year. In the example above, the expense allowance, $a - b$, is $-\$9.51$, and the modified net premium is the same as the standard premium, \$2.08. The cash values also are equal to standard cash values, with the first and second values being equal to \$0.00 and \$0.18, respectively. The result is even less desirable than that under the Chapin method, since there is no cost to a rated policyholder. The effects of longer temporary rating periods are similar, though not so drastic.

This problem can be eliminated by issuing all temporary extras as if they were permanent. The extra mortality would be added to the standard mortality rate at every duration. Since mortality rates increase at every duration, $\pi_{x_1} > c_{x_1}$ and negative cash values are eliminated, with the result that each policyholder bears the full cost of his rating.

In the example above, assume that the company requires that all term plans have a term period of at least ten years. A permanent rating of ten extra deaths per 1,000 results in a minimum modified net premium of \$11.78 for a ten-year term plan (as opposed to the \$2.08 for standard mortality). The cash value at the end of the first year is zero. A policyholder who terminates at that time will have paid an extra premium of \$9.70 to cover the rating.

At the end of the temporary extra period, one year in this example, future values can be recalculated using standard mortality, but by maintaining a high premium during the temporary period, we have eliminated the problem of decreasing cash values. The policy probably would guarantee that the extra mortality would be removed at a certain time. Alternatively, it might be removed automatically, with values illustrated in the policy showing the effect of the removal. Either way, the original calculation of plan, premium, and face amount will treat the extra mortality as permanent.

Under the internal method, it may prove useful in some situations to modify the gross premium loading formula on rated policies, in addition to modifying the mortality rates. A loading formula with a per 1,000 expense component that increases as the rating class increases adds some additional flexibility to this method while providing for the recovery of additional expenses incurred on rated business.

Participating Insurance

Dividends on rated policies can be calculated by exactly the same method as is used on standard issues, with the experience mortality, and possibly expenses, modified to reflect the rating class. The cash values and premium of the rated policy would be used instead of the corresponding standard amounts. This method would, of course, produce dividends that vary by rating class. For practical reasons, it is advantageous to have dividends on a rated policy be at least equal to those on a similar standard policy. This eliminates the possibility that policyholders will complain that they are being charged twice for a rating. Lower dividends on a rated policy could be construed as an extra hidden charge.

A higher loading in the gross premium formula can help to ensure larger dividends on a rated policy. Treating the extra mortality on a participating basis also helps. For example, if an extra g deaths per 1,000 are expected, $g/1{,}000$ would be added to the experience rates, and a multiple such as $1.2(g/1{,}000)$ would be added to the cash-value mortality rates. Using a multiple greater than 1.0 for the cash-value mortality rates adds some additional margin, which helps to ensure larger dividends on the rated policy. Percentage extras can be treated similarly; for example, if an extra 50 percent of experience mortality is expected, this amount would be added to the dividend mortality rates, while 50 percent of the 1958 CSO rates could be added to the cash-value mortality rates. Here again, more excess mortality is added to the cash-value mortality rates than to the dividend mortality rates, to help ensure larger dividends on the rated policy. The difference in cash values between rated and standard policies will have some effect on dividends through the excess interest and mortality components.

Adjustments with No Change in Rating

When the internal method is used, adjustments to plan, premium, or face amount that do not involve a change in rating can be made in the same manner as adjustments to a standard policy. The mortality rates, loading formula, and expenses are adjusted just as they would be on the issue of a rated policy.

Rating Reduction

A rating reduction can be handled quite easily by using the internal method. The cash value is determined as of the date of the rating reduction, using the original rating class. This cash value is then used as the starting point for all future calculations, which are based on the reduced rating class. When the rating is reduced, the premium can remain unchanged, resulting in an improved plan, or the premium can be reduced, leaving the plan unchanged.

In general, expense allowances are calculated by using formula (3) of the Chapin paper:

$$I_{x_m}\Delta_{x_m} = I_{x_m}(\pi_{x_m} - c_{x_m}) - I_{x_{m-1}}(\pi_{x_{m-1}} - c_{x_{m-1}}) .$$

Thus, if the net premium and face amount remain unchanged, a rating reduction is likely to result in an additional expense allowance, since

$$I_{x_m} = I_{x_{m-1}}, \qquad \pi_{x_m} = \pi_{x_{m-1}},$$

and, often, in the case of a rating reduction,

$$c_{x_m} < c_{x_{m-1}} .$$

An immediate reduction in cash value caused by a reduction in rating class may be difficult to justify to a policyholder. For this reason, a company may elect to forgo such an expense allowance.

Multiple Ratings

More than one rating may be handled in a single adjustable life policy. A policyholder may originally be issued an adjustable life policy on either a standard or a rated basis. When he applies for an underwritten increase, his health may have deteriorated so that he is now in a different rating class.

Forcing an insured to take out a separate adjustable life policy if his rating changes is not satisfactory, since it puts him in the confusing position of trying to split his premium dollars between two adjustable life policies in different rating classes, so as to maximize his return yet maintain his coverage under both policies. His premiums would accumulate more rapidly with the benefit of the higher-rated mortality, yet he must put enough into his lower-rated policy to continue this cheaper protection. We would do well to avoid this situation.

Instead, a single adjustable life policy can use an average or melded mortality table to reflect multiple ratings. This average mortality table is derived by weighting each rating by the amount of insurance issued in that rating class on that particular policy. It should be noted that the policyholder still gets credit for his lower classification on his existing coverage and falls into the higher rating class only with respect to the increase. The use of melded mortality is only a mathematical method for handling multiple classes. The actual ratings still apply to their respective pieces. A decrease in coverage normally would result in the highest-rated pieces being dropped off first, with a new melded mortality being calculated.

The following demonstration is intended to show the reasonableness of the melded mortality approach to multiple ratings. The general formula for accumulating the cash value or reserve from one year to the next is

$$
{}_{\overline{y-x_1}}V_{x_1} = ({}_{\overline{y-x_1-1}}V_{x_1} + I_{x_m}\pi_{x_m} - I_{x_m}\Delta_{x_m})(1+i) - (I_{x_m} - {}_{\overline{y-x_1}}V_{x_1})q_{y-x_1} .
$$

Assume that a policy is composed of two parts. One part, with a face amount of I_{x_m}, is issued in a class with expected mortality of aq, where a may be 1.00, 1.50, 2.00, etc. The second part, with a face amount of $I_{x_{m+1}} - I_{x_m}$, is issued in a class with expected mortality of bq. These two parts are combined in a single policy with face amount $I_{x_{m+1}}$.

In the cash-value formula shown above, the mortality aq should be applied to I_{x_m}, and the mortality bq should be applied to $I_{x_{m+1}} - I_{x_m}$. It is not clear, however, what mortality should be applied to the reserve that is offset against the face amount, since the total reserve applies to the entire policy and is neither standard nor substandard.

A possible approach is to split the reserve between classes in direct proportion to the face amount in each class; this results in the formula

$$
\begin{aligned}
{}_{\overline{y-x_1}}V_{x_1} &= ({}_{\overline{y-x_1-1}}V_{x_1} + I_{x_{m+1}}\pi_{x_{m+1}} - I_{x_{m+1}}\Delta_{x_{m+1}})(1+i) \\
&\quad - \left(I_{x_m} - \frac{I_{x_m}}{I_{x_{m+1}}}\,{}_{\overline{y-x_1}}V_{x_1}\right)(aq_{y-x_1}) \\
&\quad - \left[(I_{x_{m+1}} - I_{x_m}) - \frac{(I_{x_{m+1}} - I_{x_m})}{I_{x_{m+1}}}\,{}_{\overline{y-x_1}}V_{x_1}\right](bq_{y-x_1}) \\
&= ({}_{\overline{y-x_1-1}}V_{x_1} + I_{x_{m+1}}\pi_{x_{m+1}} - I_{x_{m+1}}\Delta_{x_{m+1}})(1+i) \\
&\quad - (I_{x_{m+1}} - {}_{\overline{y-x_1}}V_{x_1})\left[\frac{a(I_{x_m}) + b(I_{x_{m+1}} - I_{x_m})}{I_{x_{m+1}}}\right]q_{y-x_1} .
\end{aligned}
$$

Therefore, splitting the cash value in proportion to the face amounts in each class is equivalent to using an average mortality rate of

$$\left[\frac{a(I_{x_m}) + b(I_{x_{m+1}} - I_{x_m})}{I_{x_{m+1}}}\right] q_{y-x_1}\,.$$

This average mortality rate is the melded rate described above.

It can be seen that the melded mortality approach does not penalize the policyholder for a status change. He does not lose the benefit of the lower rating on his existing coverage.

This same approach is applicable to flat-extra ratings, where the extra mortality is represented by a flat addition to standard mortality, such as one extra death per 1,000.

III. EXTERNAL METHOD

A second method for handling rated adjustable life policies follows the approach commonly used on traditional policies. Under this approach, dividends and cash values on a rated policy are identical with those on a standard policy. An extra premium is charged on the rated policy to cover the expected extra mortality. This method will be called here the external method, since, in contrast to the internal method previously discussed, it does not involve the detailed inner calculations of plan, cash values, and dividends.

Variation by Plan

One of the more difficult and important questions to be answered is whether the extra premium charged under this method should vary by plan. Should a ten-year term adjustable life policy have the same extra premium as an adjustable ordinary life or ten-payment life policy? Theoretical considerations and considerations of equity both suggest an extra premium that varies by plan, while practical considerations favor an extra premium that does not vary.

There are at least two approaches to determining extra premiums for rated policies where the extra premium varies by plan. The first is to set up a discrete table with an extra premium for each plan-age combination. This approach can be troublesome. Often, when an adjustable life policy is applied for, a specific premium and face amount will be requested. The plan cannot be determined until the basic premium exclusive of the rated extra premium is known; but, if the extra premium varies by plan, it cannot be determined until the plan is known. An iterative process could be used to determine the plan, but, as indicated in Table 1, there will be "holes" where no plan exists for a given premium. Note that there is a range from \$57.98 to \$58.32 where there is no resulting plan.

A second approach to determining an extra premium that varies by plan is discussed briefly in the Chapin paper. Net premiums are calculated first with standard mortality and then with rated mortality, using the formula

$$I_{x_m}\pi_{x_m} = \frac{I_{x_m}(M_{x_m} - M_z + kD_z) - {}_{\overline{x_m - x_1}}V_{x_1}D_{x_m}}{N_{x_m} - N_w} .$$

The difference between the standard and the rated net premium is then increased by an appropriate loading to arrive at the extra premium for the rating. In the calculation using rated mortality, ${}_{\overline{x_m - x_1}}V_{x_1}$ could be the actual policy reserve using standard mortality or it could be calculated using rated mortality. Using the standard reserve has the disadvantage that a recalculation at some point after issue will result in a different extra premium even if plan, face amount, and base premium

TABLE 1

EXAMPLE: PREMIUM PER $1,000 OF COVERAGE

Plan	Standard Premium Range	Rated Extra Premium	Total Premium Range
10-pay life......	$52.23–$54.95	$6.10	$58.33–$61.05
11-pay life......	50.77– 52.22	5.75	56.52– 57.97

have not changed. On the other hand, using the reserve based on rated mortality involves considerable extra calculation and record-keeping. In effect, the internal method is being used to determine the extra premium and rated reserves, the actual reserves, cash values, and dividends being calculated on a standard basis under the external method.

Tables 2 and 3 show sample ages and ratings that were studied to determine the extra net premium needed over the full spectrum of possible plans. Linton B lapses, the 1965–70 Ultimate Basic Tables, and 5 percent interest were used. In the 150 percent extra mortality classes, the extra mortality percentage was assumed to grade down on a linear basis beginning at age 65 and reaching zero extra mortality at age 85.

As indicated by the 150 percent extra mortality figures in Table 2, an extra premium that does not vary by plan will fit reasonably for most plans. The problem areas are the short-duration term plans and the short-duration limited payment life plans. These problem areas can be reduced by limiting the plans available to the range from ten- or fifteen-year term to ten- or fifteen-payment life. Adjustable life is not really intended as a short-term static policy. It is intended that policies issued as short term will continue to be extended or "renewed." Accordingly, it may be more reasonable to try to match the cost of the ten-year term for life plan than the static ten-year term plan. Some companies may feel the need to have extra premiums vary by plan at the limited payment

TABLE 2

NET LEVEL EXTRA PREMIUM PER $1,000 OF INSURANCE NEEDED TO COVER 150 PERCENT EXTRA MORTALITY

PLAN	AGE				
	15	25	35	45	55
10-year term*	$1.38	$1.62	$2.77	$ 7.49	$19.88
10-year term for life†	2.05	2.96	5.28	11.65	23.16
Term to age 65	1.91	2.78	4.90	9.95	19.88
Ordinary life	1.89	2.75	4.88	10.00	20.32
Life paid up at age 65	1.89	2.76	4.90	10.16	22.24
20-pay life	2.14	3.05	5.19	10.16	20.21
10-pay life	2.80	3.96	6.63	12.31	22.24
5-pay life	4.14	5.86	9.73	17.63	29.80

* Assumes that the ten-year term plan will be terminated after the ten-year period.

† Assumes that the ten-year term plan will continue to be extended for subsequent ten-year term periods.

TABLE 3

NET LEVEL EXTRA PREMIUM PER $1,000 OF INSURANCE NEEDED TO COVER EXTRA MORTALITY OF 10 EXTRA DEATHS PER 1,000

PLAN	AGE				
	15	25	35	45	55
10-year term*	$ 9.52	$ 9.52	$ 9.51	$ 9.48	$ 9.42
10-year term for life†	9.46	9.51	9.49	9.45	9.38
Term to age 65	9.42	9.36	9.29	9.30	9.42
Ordinary life	9.33	9.17	8.93	8.66	8.41
Life paid up at age 65	9.36	9.24	9.11	9.13	9.94
20-pay life	10.42	10.15	9.70	9.13	8.57
10-pay life	13.34	12.94	12.23	11.20	9.94
5-pay life	19.44	18.82	17.68	15.90	13.56

* Assumes that the ten-year term plan will be terminated after the ten-year period.

† Assumes that the ten-year term plan will continue to be extended for subsequent ten-year term periods.

life end, but it is questionable whether this refinement is worth the extra administrative complications it produces.

The situation is quite similar for the ten extra deaths per 1,000 analysis, shown in Table 3, except that the term plans cause no problems.

Reserves

A separate determination of the additional reserves for the extra mortality is needed, since the regular reserve and cash-value calculations will be based only on standard mortality. A prospective reserve calculation could be made using modified mortality tables, but this could be cumbersome in the melded mortality situations. Alternatively, an approximate method probably could be devised to produce reasonable results.

Adjustments with No Change in Rating

When the external method is used with no variation in extra premium by plan, an adjustment to plan, premium, or face amount is straightforward if there is no change in rating. If the face amount decreases, the extra premium charged on that portion of the face amount is eliminated. If the face amount increases, an extra premium is charged for the increase, based on current age. The extra premium does not change if the face amount remains unchanged. After deducting the new total extra premium, the remaining premium is used in the calculation of plan or premium just as if the policy were standard.

When the external method is used with extra premiums that vary by plan, adjustments introduce a new consideration, namely, whether the extra premium after an adjustment should depend only on the resulting plan or whether it should depend also on the path taken to arrive at that plan? For example, think of two separate policies both issued at the same age and both currently on the life paid up at age 100 plan. The first policy was issued on this plan and has not changed. The second policy was issued originally as ten-year term and has just recently adjusted to life paid up at age 100, so it has a much higher premium but much lower current cash values than the first policy. Should the two policies be charged the same extra premium for their ratings? Theory might suggest that they should be charged different extra premiums, while practicalities may suggest that the extra premium should depend only on the resulting plan, not on the path taken to arrive at that plan. The approach to determining an extra premium that was discussed in Mr. Chapin's paper will produce differing extra premiums depending on the past history of the policy. The approach of using a discrete table based on age and plan will not.

Rating Reduction

A rating reduction can be handled quite easily under the external method, particularly if the extra premium does not vary by plan. The extra premium is reduced to the level that would result from the new rating, the current plan, and the age at which the rated piece was issued or added. The plan then can remain unchanged and the total premium can be reduced, or the premium can remain unchanged and the plan can be improved. If the extra premium is reduced—the total premium remaining unchanged—a decision must be made as to whether the additional premium going into the standard calculations should generate a new expense allowance. If the extra premium varies by plan, a rating reduction will involve the same difficulties discussed in prior sections—premium ranges without a corresponding plan, and calculation of extra premiums on identical plans arrived at by different paths.

Multiple Ratings

Multiple ratings in a single adjustable life policy should cause no additional difficulties under the external method. Each piece of coverage will have its own extra premium based on the age at which it was issued or added, its rating class, and, possibly, the current plan of insurance.

IV. ADVANTAGES AND DISADVANTAGES OF EACH METHOD

Of the two approaches, the internal probably could be described as the more theoretical, while the external may be the more practical. Both methods have advantages and disadvantages.

Advantages of the Internal Method

1. It accurately reflects the incidence and level of extra mortality.
2. Reserves for the extra mortality are automatically included in the calculation of total reserves.
3. A premium increase normally is not needed. Unless the plan is at the minimum level, it can be changed to a less expensive form and no extra premium need be charged. This should make rated business more acceptable and easier to place, but care must be taken to ensure that an applicant realizes that he is being rated.

Disadvantages of the Internal Method

1. Temporary extras are difficult to handle.
2. The true cost of a rating is difficult to ascertain, since dividends, cash values, premium, and plan are all affected.
3. Dividends lower than those on standard policies may result, raising objections of double charging.

4. The differing pattern of cash values, while theoretically correct, may be difficult to explain.

5. Since the premium is not split between the rated piece and the basic standard piece, it is difficult to apply a different compensation pattern to the extra rated premium.

6. Calculations may be more difficult because a special mortality table must be created for each policy with melded mortality.

Advantages of the External Method

1. It should be easy to administer because of its consistency with current practice on traditional policies.

2. It is understandable by policyholders.

3. The actual cost of the rating is readily apparent, being equal to the extra premium charged, since cash values and dividends are not affected.

4. Rated policies should be more acceptable and easier to place, since often the plan can be changed to a less expensive one, eliminating the need for increasing the premium.

Disadvantages of the External Method

1. It is not as theoretically correct as the internal method.

2. Differentiation of the extra premium by plan is difficult.

3. Extended term and reduced paid-up values would be based on standard mortality.

4. If the extra premium varies by plan, there may be premium ranges with no resulting plan.

5. Separate determination of the additional reserves for the extra mortality is needed.

DISCUSSION OF PRECEDING PAPER

WALTER L. CHAPIN:

Mr. Aschenbrenner's paper is a clear exposition of the procedures and problems of handling rated adjustable life policies using his internal and external methods. The paper is a valuable addition to the growing literature on techniques of adjustable life.

In Mr. Aschenbrenner's lists of advantages and disadvantages of each method, the first disadvantage of the external method—"It is not as theoretically correct as the internal method"—seems to me to swing the preference to the internal method, which, by the way, is used by the four participating companies now (November, 1980) issuing adjustable life. Under this method, the premiums, policy values, and dividends all relate to the substandard mortality table, whereas under the external method the premium, composed of the standard premium and substandard extra, is associated with standard values and standard dividends.

An example of a theoretically incorrect calculation is a substandard term plan where the coverage is lengthened by adding dividends to the standard reserve until the policy becomes whole life or expires earlier. If this calculation is applied to the same plan on a standard basis, the substandard term extension probably will be inconsistent with the standard term extension. If the substandard calculation is repeated with dividends and reserves using the internal system, the period of lengthening term coverage will be more consistent with that of the standard coverage.

JERRY R. MC ALLISTER:

Mr. Aschenbrenner did a good job of explaining the variations in handling substandard issues under the adjustable life policy.

At Minnesota Mutual we use both the internal and the external method. The external method is used for flat extra premiums such as temporary postoperative extras or aviation extras. In these situations, the extra premium does not affect the plan of insurance, the policy values, or the dividends.

For table-rated adjustable policies, we use what Mr. Aschenbrenner calls the internal method. I did not have a nice name for this type of procedure. When explaining it, I said it was really a throwback to the days when many rated policies used an age differential to reflect the variations in cost.

This internal method has worked well for us. The rated policy generally produces larger policy values and larger dividends. I believe it is more understandable than the way we handle traditional policies. One potential drawback is that we will get pressure to treat traditional policies in a similar manner.

Mr. Aschenbrenner describes the method of blending the mortality in the event that the mortality basis of an insured changes when he is being underwritten for an increase. Our procedure is similar to the one that he described. One thing that we do is to keep a record of each underwriting decision so that we can verify our blended or melded mortality result. This is also helpful if a rating is subsequently reduced.

In summary, I would like to congratulate Mr. Aschenbrenner on his paper. I am sure that many companies looking into the feasibility of offering adjustable life will be helped by his efforts.

(AUTHOR'S REVIEW OF DISCUSSION)

JOHN E. ASCHENBRENNER:

I would like to thank Messrs. Chapin and McAllister for their discussions. Their indications of current practice are a valuable addition to the paper.

Mr. Chapin prefers the internal approach because of its theoretical correctness. He also points out that the internal method is used by all four of the participating companies currently issuing adjustable life.

I think it is interesting to note, in Mr. McAllister's description of Minnesota Mutual's practices, that they use the internal approach for table-rated policies but have elected to use the more traditional external approach for flat extra premiums.