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A COMPARISON OF ALTERNATIVE GENERALLY ACCEPTED ACCOUNTING PRINCIPLES (GAAP) METHODOLOGIES FOR UNIVERSAL LIFE

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ABSTRACT

Several methods are currently being considered as alternative approaches to accounting for universal life policies. Existing actuarial literature does not provide a consolidated comparison of the available alternatives. This paper will analyze the similarities and differences between the existing prescribed method and the proposed alternatives.

First, the traditional premium method is reexamined with the aid of formulas, then each new method is presented. The formulas and assumptions for each method are compared.

The first appendix illustrates expected earnings patterns for a model policy valued on each method, using typical assumptions. Some recent developments are discussed in the second appendix.

The retrospective deposit approach is recommended. It is suggested that this method is part of a more general methodology, the source of earnings (SOE) approach, which may be applied not only to universal life but also to traditional life and health products, for both stock and mutual companies.

1. INTRODUCTION

Various professional bodies have been concerned with developing an appropriate accounting methodology for universal life and other interest-sensitive products. These discussions have arisen out of a growing consensus that, on this family of products, the receipt of a premium is not the event with which profit should be closely associated.

Instead profit should be recognized as the functions of the contract are performed. The discussions have resulted in some disagreement as to what are the functions of the contract, how the functions should be quantified, and the appropriate methodology.

As an aid to understanding the methods and their major objectives, we first examine the premium-as-revenue methodology currently prescribed for traditional products.

II. THE NATURE OF GAAP ACCOUNTING

GAAP holds as a principle that losses should be recognized as soon as their existence becomes known. Profits should be recognized only as they are earned over the period of the contract, and in proportion to the performance of the contract.

This principle means that the low initial level of claims which are typical of long-term life insurance contracts should not be allowed to cause the emergence of large profits in early policy durations. Instead benefit reserves are created. Increases in the reserves absorb some of the large early revenues and provide for increased claims in later years.

The benefit reserve is traditionally calculated with GAAP assumptions which are realistic but reasonably conservative, and appears to serve as a realistic index of future liabilities. However, this is very much a secondary purpose of the reserve.

In contrast with benefit payments which are initially low, the expenses associated with the issuance of the life insurance contract are initially high. Such expenses are not losses to be recognized immediately. Provided that the availability of sufficient future revenues can be demonstrated, nonlevel acquisition expenses are spread by the creation of the deferred acquisition cost (DAC) asset. The amortization of the DAC over a period of years matches expenses proportionately to the revenue earned by the contract.

The separation of the GAAP net liability into two sides of the balance sheet is primarily for accounting purposes, not actuarial purposes. The DAC and benefit reserve should be viewed together as integral parts of the reserving mechanism, whose primary (if not sole) purpose is to cause profit to be recognized in proportion to the performance of the contract. As the GAAP net liability increases or decreases each year, it balances expenses and benefits so that earnings emerge in proportion to revenue.

DAC and benefit reserves are calculated in advance, based on reasonable expectations. A measure of conservatism is used in the calculations to avoid the need for frequent changes to the mechanism due to minor or temporary variations between actual experience and the original expectations.

Traditional (premium-method) GAAP considers that the revenue earned by the contract is the gross premium. Various other measures were considered before this decision was reached, but no other choice appeared satisfactory. The valuation methodology (i.e., the calculation of both DAC and reserves and their change from year to year) is chosen such that profit will emerge each year in proportion to premiums.

How is this to be accomplished? We will need to look at a few formulas.

III. FORMULAS

We will consider first the earnings of a stock life insurance company. We will study the earnings at duration t of a plan of insurance issued at age x. For simplicity of notation, the age and duration subscripts will usually be omitted from the symbols used.

For the moment, it is assumed that there are no acquisition expenses. Other simplifying assumptions are made, for example, all events (deaths, surrenders, premium payments, and expenses) are assumed to occur at either the beginning or end of the policy year. Also, dividends are omitted for the time being.

$$\begin{aligned} E' &= (GP - ME')(1 + i') \\ &\quad - q'(DB) - w'(CSV) \\ &\quad - [p'\,{}_1V - (1 + i')\,{}_0V] \end{aligned} \tag{1}$$

where E' = earnings

GP = gross premium;

ME' = maintenance expenses;

i' = interest rate earned;

q' = mortality rate;

DB = death benefit;

w' = withdrawal rate;

CSV = cash surrender value;

p' = probability of survival for one year,

$= (1 - q' - w')$;

${}_0V$ = beginning reserve;

${}_1V$ = ending reserve.

Primed functions are used here to indicate actual experience.

Earnings of the contract in a given year are defined as the gross premium plus investment income less expenses, benefits, and the increase in reserve. It is desired that these earnings each year should be a level proportion of premiums.

The terms in the equation are generally not a level proportion of premium at all durations. The reserve will have to be defined such that its change from year to year balances the variations in the nonlevel items. The beginning and ending reserves are related by the following equation:

$$({}_0V + P - ME)\,(1 + i) = p\,{}_1V + q\,(DB) + w\,(CSV) \qquad (2)$$

where P is the benefit and maintenance expense net premium.

Unprimed functions are used to indicate benefit and maintenance expense reserve assumptions. Note here that maintenance expenses and surrender benefits are included in the formula; hence, the reserving mechanism will level maintenance expenses and surrenders in a similar manner to the leveling of death benefits.

If the benefit and maintenance expense reserve equation 2 is combined with the earnings equation 1, a new equation for earnings is produced:

$$\begin{aligned} E' \quad &= (GP - P) \\ &+ (ME - ME') \\ &+ (q - q')\,(DB - {}_1V) \\ &+ i'\,({}_0V + GP - ME') - i\,({}_0V + P - ME) \\ &+ (w' - w)\,({}_1V - CSV). \end{aligned} \qquad (3)$$

Earnings may be seen to arise from various sources. The first term is the loading; the second term arises out of expense margins; the third is due to mortality; the fourth is due to interest; and the fifth is due to surrenders.

If valuation assumptions (unprimed) could be chosen equal to actual experience, then we could set:

$$\begin{aligned} ME &= ME' \\ q &= q' \\ i &= i' \\ w &= w'. \end{aligned} \qquad (4)$$

In equation 3 the second, third, and fifth terms disappear completely, and earnings are seen to be:

$$E' = (GP - P)\,(1 + i'). \qquad (5)$$

If we now define P to be always proportional to GP, then E' will also be proportional to GP. (This statement ignores the interest term, which appears because our algebraic development gives the value of earnings at the end of the year.) Thus our objective of recognizing earnings in proportion to the

gross premium has been achieved, through the choice of benefit reserve assumptions and methodology.

Present value of earnings: The present value at issue of the earnings stream is not dependent on the benefit reserves. A summation formula for ${}_tE'$ sums the difference between the beginning and ending reserves such that only the reserve at the beginning of the first year, and that at the end of the last year, remain. If some arbitrary change were made to the reserves in one or more years, the present value at issue of the earnings would not change, although earnings would shift between years. In other words the benefit reserves control the timing of emergence of earnings, but not the present value of the earnings.

Deferrable expenses: Up to this point, acquisition expenses have been assumed to equal zero. If acquisition expenses exist, an asset equal to those expenses is created at issuance of the insurance policy. The company's income statement, therefore, does not show a loss due to those expenses.

The asset is amortized over the revenue earning period of the contract. The yearly cost of amortization appears in the income statement as an expense, offsetting against earnings. If this amortization expense is made proportional to gross premiums, then earnings will remain proportional to gross premiums.

We show a new equation for earnings based on equation 1, but including new terms which describe the effect of deferrable expenses and their amortization.

$$\begin{aligned} E' &= (GP - ME' - DE')(1 + i') \\ &\quad - q'\,(DB) \\ &\quad - w'\,(CSV) \\ &\quad - [p'\,{}_1V - (1 + i')\,{}_0V] \\ &\quad - [p'\,{}_1DAC - (1 + i')\,{}_0DAC] \end{aligned} \tag{6}$$

where

DE' = deferrable expenses of that year;
${}_0DAC$ = beginning DAC asset; the normal sign of this is negative, i.e., we are treating this as a negative reserve;
${}_1DAC$ = ending DAC.

The beginning and ending DAC are related by the equation:

$$({}_0DAC + DEP - DE)(1 + i) = p\,{}_1DAC \tag{7}$$

where DEP = the net premium for deferrable expenses. As before, we

define the net premium to be proportional to the gross premium. Unprimed functions are used here to indicate the same valuation assumptions as were used for the benefit reserve.

By rearranging

$$\begin{aligned} E' &= (GP - P - DEP) \\ &+ (DE - DE') \\ &+ (ME - ME') \\ &+ (q - q')(DB - {}_1V - {}_1DAC) \\ &+ i'\,({}_0V + {}_0DAC + GP - ME' - DE') \\ &- i\,({}_0V + {}_0DAC + P + DEP - ME - DE) \\ &+ (w' - w)({}_1V + {}_1DAC - CSV). \end{aligned} \tag{8}$$

$(P + DEP)$ is the total net premium for benefits and expenses, and $({}_1V + {}_1DAC)$ is the net liability. As before, if we choose valuation assumptions equal to actual, including $DE = DE'$, most terms disappear:

$$E' = (GP - P - DEP)(1 + i'). \tag{9}$$

Here, as in equation 5, if the interest term is ignored, E' is proportional to the gross premium:

$$E' = k\,GP' \tag{10}$$

where

$$k = (1 - N/G). \tag{11}$$

N/G is the net-to-gross premium ratio, or $(P + DEP)/GP$.

We have achieved the objective of premium-method GAAP, namely that earnings should be proportional to gross premiums. We have achieved this result through the choice of the DAC and benefit reserve assumptions, and through the development of the methodology, including the definition of net premiums as proportional to gross premiums and the use of interest in the benefit reserve and DAC formulas.

GAAP assumptions: It is obviously impossible to prospectively set valuation assumptions equal to actual. It would presumably be possible to choose realistic assumptions which are very close to actual. However, the prescribed approach is to deliberately introduce small margins of conservatism into the realistic assumptions. We shall call such assumptions GAAP assumptions:

$$\begin{aligned} DE &= DE' + \Delta DE \\ ME &= ME' + \Delta ME \end{aligned}$$

$$\begin{aligned} q &= q' + \Delta q \\ i &= i' - \Delta i \\ w &= w' - \Delta w. \end{aligned} \tag{12}$$

The unprimed valuation assumptions are close to realistic expectations, the differences Δ being provisions for the risk of adverse deviation from realistic assumptions.

Then

$$\begin{aligned} E' \quad &= (GP - P - DEP)(1 + i') \\ &+ \Delta DE\ (1 + i') \\ &+ \Delta ME\ (1 + i') \\ &+ \Delta q\ (DB - {}_1V - {}_1DAC) \\ &+ \Delta i\ ({}_0V + {}_0DAC + P + DEP - ME - DE) \\ &+ \Delta w\ ({}_1V + {}_1DAC - CSV). \end{aligned} \tag{13}$$

Actual earnings therefore emerge partly in proportion to the gross premium, and partly as the various margins are released. If actual experience matches the GAAP assumptions exactly, i.e., if all margins prove to be zero, then earnings are exactly proportional to premiums.

Addition of margins: There may be a considerable effect on the Sources of Earnings depending on which margins are added, and the magnitude of the margins. Large margins will reduce GAAP expected earnings, i.e., that part of earnings which emerges in proportion to premiums. However, the present value of total actual earnings is not increased or decreased by altering the valuation assumptions. There is merely a shift of the timing of actual earnings from premium proportionality to the rate of release of the margin. Depending on the margin, the earnings released may be front-ended or deferred, compared to the premium revenue stream.

The direction for adjusting assumptions to add margins is prescribed as that which increases the net premium, and the net liability. Increasing the net liability implies deferral of earnings to the later part of the life of the contract. Much caution is needed in adding the margins, since their effect year by year depends on their magnitude, sign, and whether the GAAP net liability is positive or negative.

The complement of the net-to-gross ratio indicates the percentage of earnings which is proportional to gross premiums. The percentage of earnings which will emerge as margins are released is concealed within the total net premium, since the net premium is greater than it would have been if it had been calculated with realistic assumptions.

Actual experience versus GAAP assumptions: The first line of equation 13 represents GAAP expected earnings. Expected earnings differ from actual earnings for two reasons. In the first place, expected earnings differ from realistic expectations due to the provisions for adverse deviation. As actual experience proves to be better than GAAP assumptions, these margins release in accordance with the last four lines of equation 13.

The second difference arises when deviations from realistic assumptions occur. These unexpected deviations affect earnings in the year in which they occur, and it is not considered appropriate to eliminate them through the reserving mechanism.

Recoverability: At issue, if the GAAP net-to-gross ratio exceeds one, expected earnings are negative. GAAP requires that the loss should not be deferred. First, the provisions for adverse deviation should be progressively removed. During this process, if the net premium becomes equal to the gross, the assumptions become the GAAP assumptions. If, after removing all margins, the net premium still exceeds the gross, DAC should be written off to the extent necessary such that the net premium (for benefits, maintenance expenses, and the reduced proportion of deferrable acquisition expenses) equals the gross. Expected future earnings are zero, so future losses are not deferred and future profits are not created.

Loss Recognition: During the lifetime of the contract, if there is an unexpected adverse deviation in experience, depending on the magnitude of the deviation there may be an actual loss in that year. Normally no change is made to the valuation assumptions or methodology, provided that there remains sufficient expected future earnings to amortize DAC. This is the "lock-in" principle.

If the unexpected deviation appears permanent and there are insufficient future earnings to fully amortize the DAC, then loss recognition occurs. DAC is reduced, most likely assumptions become the new GAAP assumptions, and expected future earnings are zero.

If the deviation in experience is extreme, the DAC is written off entirely. Further, the benefit reserve is calculated with new current assumptions indicative of the new realistic expectations. This would increase the benefit reserve. The new net premium should not be permitted to exceed the gross premium.

Dividends: If this stock company example were extended to include dividends, a dividend term would be added to the benefit reserve formula. Anticipated dividends would be leveled by the operation of the reserving mechanism, such that earnings would remain a level proportion of premiums.

Nondeferrable acquisition expenses: Current accounting standards define acquisition expenses which may be deferred as "those costs that vary with and are primarily related to the acquisition of new and renewal insurance contracts" as stated in Financial Accounting Standards Board (FASB) Statement No. 60. Some expenses are neither maintenance expenses nor acquisition expenses that may be deferred.

Such expenses remain outside of the GAAP valuation mechanism. They are not leveled out, so they reduce earnings at the time they occur.

Nonlevel gross premiums: With premium-method GAAP, earnings are proportional to gross premiums even if the gross premiums themselves are not level. For example, in the case of a limited-payment policy, expected earnings are zero after the end of the premium paying period, although the contract may have many more years to run.

In the case of the annual renewable term policy, where premiums increase with policy duration, earnings increase proportionately, and consequently the amortization of the DAC is weighted heavily toward the end of the policy term. As a result, the DAC is amortized very slowly at first, if at all. Due to the accrual of interest DAC may actually increase for many years before starting to decline.

IV. RETROSPECTIVE DEPOSIT METHOD

With the introduction of single and flexible premium deferred annuities, universal life, and other interest-sensitive products came the realization that the premium may be an inappropriate index by which to measure the performance of the contract. The nature of the contract came to be examined more closely. Several methods have emerged from this process. They are described in the Issues paper of the American Institute of Certified Public Accountants (AICPA) Insurance Committee (November 1984) [1].

One body of thought considers that the fund held by the insurance company on behalf of the policyholder is of the nature of a deposit, and so the reserve held should be equal to the policyholder's account value. No earnings are recognized at the moment a premium is received; the entire premium (less front-end load) is credited to a liability account.

Over the lifetime of the contract, the policyholder's account increases with the addition of premium payments and interest and is reduced by deductions for mortality charges, expense loads, and surrenders. These various services are the functions provided to the policyholder by the company.

The company can expect to earn profits from the functions it performs. For example, in performing the investment function, the company may realize a spread between the interest rate earned on invested funds and the

interest rate credited to the policyholder's account. The company may realize other gains; for example, gains due to mortality and expense loadings. The gains comprise the revenue stream to which deferred expenses are matched.

Here again the desired matching of earnings with revenue can be achieved with the appropriate choice of reserving methodology and assumptions.

Equation 1 is almost unchanged in appearance:

$$\begin{aligned} R' &= (GP - ME')(1 + i') \\ &\quad - q'(DB) - w'(CSV) \\ &\quad - [p'\,{}_1V - (1 + i')\,{}_0V]. \end{aligned} \tag{1a}$$

This equation defines R', the expected revenue stream, prior to the amortization of DAC. Primed functions mean GAAP assumptions, i.e., realistic assumptions with relatively small provisions for adverse deviation.

The formula for calculating the account value is used as the reserve formula in

$$({}_0V + GP - ME)(1 + i) = p\,{}_1V + q\,(DB) \tag{14}$$

where $p = 1 - q$. ${}_tV$ is the account value.

The valuation net premium is the gross premium. Here, unprimed functions mean those assumptions used in the accumulation of the account value. This gives

$$\begin{aligned} R' &= (ME - ME') \\ &\quad + (q - q')(DB - {}_1V) \\ &\quad + i'({}_0V + GP - ME') - i({}_0V + GP - ME) \\ &\quad + w'({}_1V - CSV). \end{aligned} \tag{15}$$

ME means the front-end load, if any is available, and the term $({}_1V - CSV)$ is the surrender charge.

Equation 15 shows the sources of revenue to be expenses; mortality, to the extent that actual mortality experience is lower than the mortality charges built into the contract; interest, to the extent that there is an excess of interest earned over that credited; and surrenders, depending on actual withdrawal experience and the surrender charge. Equation 15 is similar in appearance to equation 3 except for the withdrawal term, and except that the loading term is zero.

Here, the benefit reserve was defined before the revenue stream. With the premium method, the revenue stream was defined first and the reserve methodology was set up to appropriately implement the decision. Retrospective deposit method revenue will generally not be proportional to premiums.

As with the premium method, we must distinguish between actual experience and GAAP assumptions. Equation 15 may be used in either case. If primed functions are used to indicate GAAP assumptions, the equation shows that the expected revenue stream arises from margins between GAAP and benefit reserve assumptions. If primed functions are used to indicate actual experience, actual revenue arises from margins between actual experience and benefit reserve assumptions. Actual revenue therefore consists of expected revenue plus the release of the provisions for adverse deviation in the GAAP assumptions.

Equation 15 gives revenue prior to the amortization of DAC. If a uniform proportion of that revenue stream is used to amortize the DAC, then earnings will be proportional to revenue, i.e.,

$$[{}_0DAC + (1 - k)\,R' - DE]\,(1 + i') = p'\,{}_1DAC \tag{16}$$

using GAAP assumptions; k is chosen such that, on a present value at issue basis with GAAP assumptions:

$$\Sigma_t\, v^t\,{}_tp_x\,(DE) = (1 - k)\,\Sigma_t\, v^t\,{}_tp_x\,(R') \tag{17}$$

and

$$E' = k\,R'.$$

At issue, if k is negative, DAC is not fully recoverable. Provisions for adverse deviation are first removed progressively, and if necessary, a proportionate part of the DAC is written off immediately. The present value of expected future earnings would be zero.

If there should be further deterioration of experience, to the point that expected revenue becomes negative, DAC would be written off completely. The benefit reserve assumptions would be changed to realistic assumptions based on actual experience, thus increasing the benefit reserve. The present value of expected future revenue would be zero.

Deferrable expenses: With premium-method GAAP, where the DAC is amortized using a level percentage of gross premium, any expenses which are a level percentage of premium may be ignored in developing DAC factors. For example, if deferrable expenses were a level percent of premium in all years, they would be automatically matched to the premium revenue stream, and the DAC calculated for all years would be zero. Net deferrable expenses are therefore only the excess of first-year expenses over ultimate renewal expenses.

This is not necessarily valid when the DAC is amortized with other than a level percentage of premium. Consider an expense *ME'* which is inadvertently deferred, instead of being offset against the revenue stream. The present value of earnings is unaffected by the incorrect classification, but both the revenue stream and the deferrable expenses are overstated by *ME'*. While the reclassification affects only one year, the fraction of the revenue stream needed to amortize the DAC changes, thus changing the amortization revenue in every policy year. Therefore the earnings pattern is altered by the change.

Even expenses which are level per unit or as a percent of premium in all years will change the rate of amortization, depending on whether they are offset against the revenue stream or deferred. The nature of the expenses must be examined, and they should be deferred if they are acquisition expenses, whether level or not, in accordance with current accounting standards. This applies with any GAAP methodology. The definition of deferrable expenses is not dependent on the particular revenue stream used to amortize them.

Excess first-year loads: Any excess front-end loads built into the policy are presumably intended to cover acquisition costs. Other front-end loads may also be intended to cover acquisition costs. Deferrable expenses should constitute acquisition expenses net of such loads, i.e., the load should amortize deferrable expenses immediately as opposed to being included in the revenue stream. If the front-end load exceeds the acquisition expense, the excess is included in revenue.

Even if acquisition costs and front-end loads are level in all years after the first, the amortization schedule for DAC will vary depending on whether the offset is made.

Choice of assumptions: To implement the deposit method, both GAAP and benefit reserve assumptions are needed. First a determination should be made as to what are realistic expectations of future experience; pricing assumptions may be used as a guideline. Second, GAAP assumptions should be chosen which contain a small margin for conservatism, compared with realistic assumptions. These GAAP assumptions will be used to develop the DAC amortization schedule.

The third step in the process is adding margins to the GAAP assumptions, giving the benefit reserve assumptions. The benefit reserve is, of course, a projection, based on which an amortization schedule is developed. After the policy is issued, the actual account value becomes the benefit reserve.

The expected revenue stream is more sensitive to the amount of margin added to the GAAP assumption than to the underlying assumption itself. The margins therefore need to be carefully chosen.

A final step in setting assumptions might be to compare the benefit reserve assumptions with the assumptions used to illustrate projected account values for marketing purposes. If pricing assumptions were realistic and the anticipated margins are reasonable, then the assumptions for illustration and those for benefit reserves should be very similar.

Negative Revenues: It could occur in some policy years that one or more of the sources of revenue are negative. It could even occur that the combined revenue stream for a particular year is negative. This has no particular significance, and is not a loss to be immediately recognized, provided that it is recoverable out of future margins. Negative revenues therefore should be allowed to stand. They are capitalized, then later amortized, by the operation of the DAC amortization.

V. PROSPECTIVE DEPOSIT METHOD

A second method, quite different in its practical approach, also causes the emergence of earnings as margins built into the contract are released. This method is actually a full release from risk method, and perhaps should be so called.

In this method the valuation net premium for benefits, maintenance expenses, and deferrable acquisition expenses is made equal to the gross by increasing the provisions for adverse deviation. The reserves have no necessary relationship to the policyholder's account, except by coincidence or contrivance.

The applicable equations are (2), (6), (7), and (8), as presented for the premium method. The equation for earnings is

$$\begin{aligned} E' &= (GP - P - DEP) \\ &+ (DE - DE') \\ &+ (ME - ME') \\ &+ (q - q')\,(DB - {}_1V - {}_1DAC) \\ &+ i'\,({}_0V + {}_0DAC + GP - ME' - DE') \\ &- i\,({}_0V + {}_0DAC + P + DEP - ME - DE) \\ &+ (w' - w)\,({}_1V + {}_1DAC - CSV). \end{aligned} \tag{8}$$

Unprimed functions here are valuation assumptions chosen such that $GP = (P + DEP)$; the first term therefore disappears. Assuming that we defer in our valuation mechanism only actual deferrable expenses, then $DE = DE'$, and the second term also disappears. Earnings therefore emerge as the expense, mortality, interest, and withdrawal margins are released.

Choice of assumptions: It is not difficult as a practical matter to add margins such that the net premium increases, except that, in the case of the withdrawal assumption, the sign of the margin may have to be found by trial.

However, it is difficult to intuitively appreciate the degree of conservatism caused by a particular margin. The extent to which a margin postpones or front ends earnings will usually have to be tested, since the revenue each year is quite sensitive to minor changes in the assumptions. The margins may need to vary by duration to provide conservatism and to reflect increasing uncertainty further in the future.

One example of the sensitivity of assumptions and the need to vary margins by duration is that of the interest revenue, which may be positive or negative depending on whether the net liability is positive or negative at that duration.

In the case of the expense term in the benefit reserve, it is common to use unit maintenance expenses which are a level percent of premium. If this margin is excessive, most earnings will release in proportion to premiums. To avoid this, it seems that little if any margin should be added to the realistic expense assumptions.

Expected earnings: Although actual earnings will presumably be positive, the expected earnings using the assumptions chosen are zero. If actual experience equals assumptions, actual earnings will be zero.

If actual experience should gradually deteriorate over a period of time, actual earnings will be eroded, but no immediate change in the valuation methodology would be required. If the deterioration of experience was sufficiently severe that actual earnings became negative, then the valuation assumptions would have to be changed to realistic current assumptions, and DAC would have to be written down. The new expected future earnings would be zero, and there would be a higher GAAP net liability.

DAC amortization pattern: DAC is not amortized in proportion to expected revenue, rather it is amortized in proportion to the gross premium as in the premium method, although with different assumptions. The DAC and benefit reserve operate together to produce an earnings pattern proportional to the margins in the valuation assumptions.

Earnings pattern compared with deposit method: While the prospective deposit (full release from risk) method and the retrospective deposit method (the deposit method) require that loading revenue be zero, the execution and the results are quite different. Although the present values at issue of earnings are the same in either case, generally there will be different earnings patterns.

In the first place, the benefit reserve projection of the deposit method does not involve a lapse assumption. Since the full release from risk method does, the revenue streams from the two will not be algebraically identical. Second, the amortization of DAC in the deposit method is not proportional to premiums; this is an algebraic difference also. Third, the deposit method uses GAAP assumptions for DAC which are different from benefit reserve assumptions, while the full release from risk method uses the same assumptions for both DAC and benefit reserves.

If there were no deferrable expenses ($DE = 0$ and $DAC = 0$) and no surrender charge ($CSV = {}_1V$), then equations 8 and 15 would be identical. If we then chose valuation assumptions equal to those used for the account value, the full release from risk method reserves would equal the projected account value, and the two earnings streams would be identical. If any other valuation assumptions were chosen, the earnings streams would differ.

The formula development of the full release from risk method is identical to the premium method. The part of earnings which is proportional to premiums is different between the two methods, because of the different magnitude of the provisions for adverse deviation which have been added.

VI. COMPOSITE METHOD

As a compromise between those who believed that premium-method GAAP was still appropriate and those who believed that no earnings should be recognized in proportion to premium, the composite method appeared. A substantial part of earnings is proportional to premium.

This methodology is similar to both the premium method and the full release from risk method, except that the provisions for adverse deviation are intermediate between the two. Starting with GAAP assumptions, margins are added such that the net premium increases, but to a point lower than the gross premium.

The algebraic analysis of this method is identical to that presented previously, except that $(P + DEP)$ is less than GP; therefore, the loading term in the formula does not disappear. Equation 8 describes the earnings:

$$
\begin{aligned}
E' &= (GP - P - DEP) \\
&+ (DE - DE') \\
&+ (ME - ME') \\
&+ (q - q')\,(DB - {}_1V - {}_1DAC) \\
&+ i'\,({}_0V + {}_0DAC + GP - ME' - DE') \\
&- i\,({}_0V + {}_0DAC + P + DEP - ME - DE) \\
&+ (w' - w)\,({}_1V + {}_1DAC - CSV). \qquad (8)
\end{aligned}
$$

The earnings which emerge in proportion to premiums are indicated by the complement of the net-to-gross premium ratio.

With this method there are difficulties not only in adding the margins, as before, but there is also the question of how much of the expected revenue should emerge in proportion to premiums. The margins to be added are not as great as with the full release from risk method, since the net premium is to be less than the gross.

VII. COMPARISONS

The four alternatives presented thus far cause earnings to emerge from the life insurance contract in proportion to the revenue stream. There are several distinctions between the methods.

One difference is that, for the retrospective deposit method, there is a two-stage process. In the first stage, the revenue stream is developed ignoring DACs. In the second stage, a uniform part of the revenue stream is used to amortize the DAC. Other methods rely at least partially on the net-to-gross premium ratio, and therefore, the DAC and benefit reserves are calculated simultaneously and with the same assumptions.

For the retrospective deposit method, generally different assumptions will be used for the first stage than for the second. The benefit reserve is the policyholder's expected account value, and it is calculated based on assumptions which provide margins for expected revenue. The DAC is amortized using GAAP assumptions, i.e., realistic assumptions with some provision for adverse deviation.

In the retrospective deposit method, DAC is amortized with a proportion of the revenue stream. The other methods amortize the DAC in proportion to premiums. This does not imply that revenue is necessarily proportional to premiums. However the distinctions between the revenue stream, the DAC

amortization, and the remaining earnings seem clearer with the premium method and the retrospective deposit method than with the other methods.

With the retrospective deposit method, the actual benefit reserve has a clear meaning: it is the policyholder's account value. With the other methods, the benefit reserve is more abstract. It represents the present value of benefits and expenses on assumptions chosen so that the net premium meets a target value relative to the gross premium.

Examples: In appendix I, we illustrate the earnings pattern of a typical universal life policy as reported by each of the preceding methods. We also show some variations of the methods. The earnings vary considerably by duration despite the fact that the present values at issue are identical. The variations for a given method resulting from relatively minor changes in assumptions are also large.

VIII. SOE APPROACH

The retrospective deposit method may be regarded as a special case of a more general approach, the Sources of Earnings (SOE) approach. The SOE approach considers the revenue to arise from the margins in the contract. The equations which define the SOE approach are the same as those shown previously for the deposit method except that the valuation net premium is not necessarily equal to the gross premium.

$$\begin{aligned} R' &= (GP - ME')(1 + i') \\ &\quad - q'(DB) - w'(CSV) \\ &\quad - [p'\,{}_1V - (1 + i')\,{}_0V] \end{aligned} \tag{1a}$$

$$({}_0V + P - ME)(1 + i) = p\,{}_1V + q(DB) \tag{18}$$

where $p' = 1 - q' - w'$; and $p = 1 - q$; primed functions are GAAP assumptions; and unprimed functions are the benefit reserve assumptions.

Revenues prior to amortization of the DAC are defined as follows:

$$\begin{aligned} R' &= (GP - P) \\ &\quad + (ME - ME') \\ &\quad + (q - q')(DB - {}_1V) \\ &\quad + i'({}_0V + GP - ME') - i({}_0V + GP - ME) \\ &\quad + w'({}_1V - CSV). \end{aligned} \tag{19}$$

Note, there may be some loading revenue.

These equations define a method that could be considered to be the general method encompassing the premium method, a full margin method, and the composite method (but not the full release from risk method). The algebraic description of each is the same, but the methods are distinguished by the different magnitude of margins added to the benefit reserve assumptions.

The retrospective deposit method is a special case of the SOE method since the actual benefit reserves are defined. Since the benefit reserve net premium equals the gross, there is zero loading revenue.

Earnings $E' = k\,R'$ where k is found from the present value of deferred expenses and revenues, i.e.,

$$(1 - k) = \Sigma\, v'_t\, {}_tp_x\, (DE)/\Sigma\, v'_t\, {}_tp_x\, (R') \tag{20}$$

where $(1 - k)$ is the part of revenues needed to amortize DAC, as follows:

$$[{}_0DAC + (1 - k)\,R' - DE]\,(1 + i') = p'_1 DAC, \tag{21}$$

k should not be less than zero.

Benefit reserve assumptions: Earnings arise from the release of the margins between GAAP assumptions and the benefit reserve asumptions. For this reason SOE benefit reserve assumptions may be considered the baseline from which earnings are measured.

The baseline assumptions may be regarded as those assumptions which define a common level of understanding between the company and the policyholder. On the one hand, the company guarantees a certain level of experience which it can reasonably expect to achieve over the lifetime of the contract. The company expects to gain only if actual experience is better than baseline assumptions. On the other hand, the policyholder presumably knows that the company may have better experience than baseline assumptions, but at least his equity is secure because the company uses baseline assumptions to provide for its future obligations.

In the ideal case, benefit reserve assumptions could be set completely objectively. For example, if the contract guarantees a certain set of assumptions for the accumulation of value, those assumptions may be considered the baseline. In most other cases, actuarial judgment will be needed to determine where the baseline lies.

If the baseline assumptions are reasonable, the term $(GP - P)$ should usually be small. Also this is consistent with the concept that little if any revenue should emerge in proportion to gross premiums.

SOE for universal life: The baseline should not necessarily be set at the guarantees shown in the policy form. For example, the insurance company

may currently be crediting interest rates far in excess of the contractual guarantee. If this situation is expected to continue for the foreseeable future, the credited rate represents the common level of understanding between the company and the policyholder. The company knows that it must earn interest at a rate higher than that illustrated, and the policyholder who buys the policy presumably relies on the illustrated values in agreeing to the contract.

Similarly the current mortality charges may be lower than the contractual guarantee, but the former are the baseline from which earnings are measured.

SOE for traditional life products: The SOE method may also be applied to traditional products. Contractual assumptions from which the company may measure earnings are the standard nonforfeiture assumptions.

The development of formulas is identical to that shown previously. A revenue stream is generated from the margins between GAAP expected experience and the baseline assumptions, and the DAC is amortized by a level proportion of that revenue.

If the premium method is considered from the perspective of the SOE approach, the use of near realistic assumptions as baseline assumptions implies that the company can perform at those levels. In effect, actual experience is expected to improve from GAAP assumptions. Instead, if SOE concepts were applied, more conservative benefit reserve assumptions would be used. The net liability would be higher and earnings would be deferred, compared to the premium method.

SOE for individual accident and health business: SOE may also be applied to individual health insurance. If statutory valuation standards exist, they may be considered the baseline assumptions. Alternatively the company may choose reasonably conservative assumptions at a level such that positive earnings are likely to emerge. The formula development is similar, except that S_x would replace $(DB)q_x$;

$$\begin{aligned} R' &= GP\,(1 + i') - ME'\,(1 + i') \\ &\quad - (1 + 1/2i)\,S' \\ &\quad - [p'\,{}_1V - (1 + i')\,{}_0V] \end{aligned} \tag{22}$$

where S' is actual claim cost assumed paid at the midpoint of the year. Mortality generally need not be treated as a separate decrement; then $p' = 1 - w'$. The reserves are defined by

$$({}_0V + P - ME)(1 + i) = S(1 + 1/2i) + p\ {}_1V. \tag{23}$$

This gives, for revenue by source,

$$\begin{aligned} R' = {} & (GP - P) + (ME - ME') \\ & + (S - S') \\ & + i'({}_0V + GP - ME' - 1/2S') \\ & - i({}_0V + P - ME - 1/2S) \\ & + (w' - w)\ {}_1V. \end{aligned} \tag{24}$$

It seems appropriate to include a withdrawal assumption in the reserve formula to avoid causing a disproportionate share of the revenues to arise out of the large release of reserves at lapse. Also substantial margins should probably be added to S', both to reflect the greater uncertainty in projecting accident and health claims compared to projecting life claims, and to avoid having the loading term produce a disproportionate share of total revenue.

SOE for mutuals: Mutual companies are accustomed to measuring earnings by source from baseline assumptions in accordance with the contribution principle. The algebraic analysis has an added term in the revenue formula for dividends:

$$\begin{aligned} R' = {} & (GP - ME')(1 + i) - D' \\ & - q'(DB) - w'(CSV) \\ & - [p'\ {}_1V - (1 + i')\ {}_0V] \end{aligned} \tag{25}$$

which is similar to equation 1. The equation for the benefit reserve is

$$({}_0V + P)(1 + i) = p\ {}_1V + q(DB) \tag{26}$$

where

$$p = 1 - q.$$

Here, maintenance expenses, dividends, and withdrawals are excluded from the benefit reserve formula.

The following dividend formula is now proposed:

$$\begin{aligned} D' &= (GP - P - ME'' - DEA) \\ &\quad + (q - q'')\,(DB - {}_1V) \\ &\quad + (i'' - i)\,({}_0V + P) \\ &\quad + w''\,({}_1V - CSV) \end{aligned} \tag{27}$$

where double primed functions are the dividend experience assumptions on which the dividends are based. *DEA* is an explicit provision in the dividend formula for the amortization of deferrable acquisition expenses, without which the dividends would pay profits back to the policyholders without first covering acquisition costs. The reserves in this formula are the same as in equation 26. We can substitute this equation into equation 25:

$$\begin{aligned} R' &= DEA + (ME'' - ME') \\ &\quad + (q'' - q')\,(DB - {}_1V) \\ &\quad + i'\,({}_0V + GP - ME') - i''\,({}_0V + P) \\ &\quad + (w' - w'')\,({}_1V - CSV). \end{aligned} \tag{28}$$

A uniform proportion of R' is used to amortize deferrable acquisition expenses, using assumptions which include provisions for adverse deviation.

Revenue arises out of the difference between actual experience and dividend assumptions. If actual experience is used as the dividend assumptions, revenue will emerge in proportion to the explicit provision *DEA*. If dividend assumptions are based on actual experience less a margin for conservatism, the emerging revenue will be proportional partly to the explicit provision and partly to the margins released. If there is no specific provision *DEA*, then the dividend experience assumptions must contain large enough margins over expected experience that there is sufficient revenue to amortize the DAC.

Many different dividend formulas are possible, based on different reserves (or funds) and perhaps including different terms. For example, if dividends on certain product lines were guaranteed, the dividends might be reserved for as a benefit.

In the case of universal life for a mutual company, as for a stock company, the baseline assumptions should not necessarily be the assumptions guaranteed in the policy. Those assumptions would inflate expected revenue by

ignoring the very strong likelihood of dividends being paid in the form of excess interest or reduced current mortality charges. Some level of expected dividends should be anticipated, and this may be achieved by using current interest and mortality rates for the baseline assumptions.

The conclusion is that GAAP for mutuals should use net level reserves with conservative baseline assumptions. The baseline asumptions may be equal to statutory asumptions; equal to the assumptions used in the dividend process; or based on policy guarantees. The DAC is then amortized using a level proportion of the resulting revenue stream.

It would seem logical that a method appropriate for interest-sensitive products should fit participating policies issued by a mutual company. The use of current assumptions by a stock company in the accumulation of universal life account values bears a close resemblance to the payment of a dividend based on dividend assumptions by a mutual company. In each case, the policyholder receives a share in profits which arise because experience proves better than baseline assumptions.

IX. CONCLUSION

The various methods as proposed in the AICPA Issues paper and as discussed here appear to be workable and theoretically sound. The retrospective deposit method may be the least subjective in application and perhaps is the most understandable method.

The SOE method, a general methodology which encompasses both the premium method and the deposit method, also appears to address the theoretical issues with a high degree of generality and objectivity.

X. ACKNOWLEDGMENTS

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APPENDIX I

Some illustrations of the alternative methodologies are presented here. The sample policy illustrated is the same in every case. The policy is a level face amount flexible premium universal life issued to a male nonsmoker

aged twenty-five. Premiums are a level five dollars per unit ceasing after twenty years, with an assumed initial lump-sum deposit equal to one annual premium. There is a small front-end load plus surrender charges which are level for five years, declining to zero at the end of the fifteenth year.

Mortality charges produce a substantial part of the total revenues. Significant revenues also arise from surrender charges and the interest spread. The front-end load is lower than actual expenses, so expense loading is a net negative source of earnings; this is typical of rear-end loaded policies.

The credited interest rate is 10 percent in all years. GAAP assumptions include a fairly high (25 percent) assumed lapse rate in the first year, declining to 6 percent in the tenth year and thereafter. Mortality is approximately 50 percent of the 1965–70 Select and Ultimate, male table. The earned/credited interest spread is 150 basis points. Realistic actual maintenance and deferrable acquisition expenses are used. Nondeferrable acquisition expenses are excluded.

Each set of results shows sample values of the DAC and benefit reserve factors. The factors shown are expressed per unit in force at the end of the policy year.

Each example shows earnings both numerically and graphically. The earnings shown here are "actual," assuming that realistic expectations are realized without deviation; therefore, earnings include both GAAP expected earnings and earnings which arise out of the release of margins.

The ordinate of the graph is the value of earnings as at the beginning of each policy year per unit issued.

The present value of earnings at issue based on the realistic assumptions is 3.97 percent of the present value of gross premiums. This applies to every example regardless of the method chosen for benefit reserves, and regardless of the method chosen to amortize DAC.

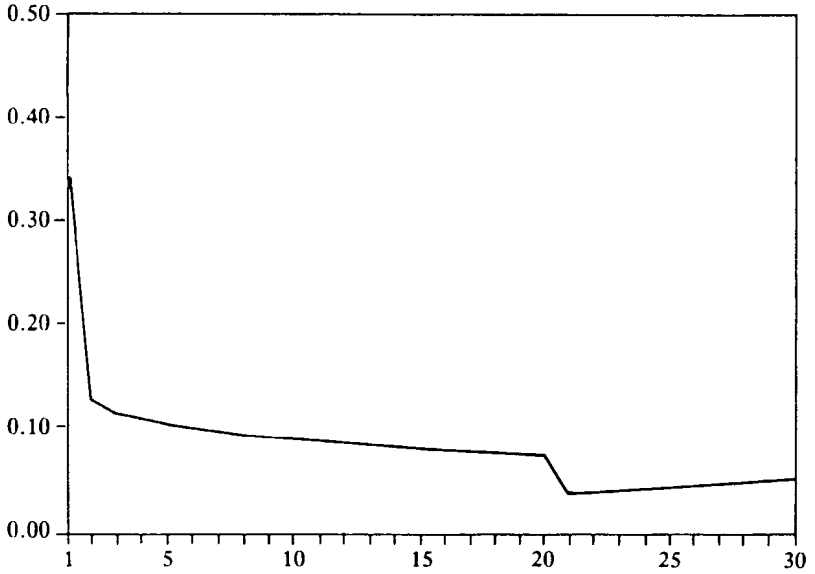
All graphs and calculations run for thirty years. Where possible the scale of the graphs has been kept constant. A brief commentary follows:

Premium method earnings: Graph 1 shows the typical declining pattern with a larger than normal maximum in the first year due to the lump-sum deposit. Earnings fall to near zero at the twenty-first year, when premiums cease, after which the provisions for adverse deviation are released. Here the margin was kept very small; large margins would produce revenue patterns similar to the prospective deposit method.

The retrospective deposit method: Graph 2 also shows a peak in earnings in the first year. This does not arise out of any connection with premiums or the lump-sum deposit. If the lump-sum deposit assumption were removed,

GRAPH 1

TRADITIONAL METHOD WITH
PROVISIONS FOR ADVERSE DEVIATION



t	*tDAC*	*tV*	*t E'*
1	7.33	7.71	0.346
2	7.70	12.17	0.133
5	7.71	27.36	0.106
10	6.72	64.04	0.093
15	4.71	121.36	0.082
20	0.00	212.24	0.077
25	0.00	341.94	0.045
30	0.00	564.91	0.053

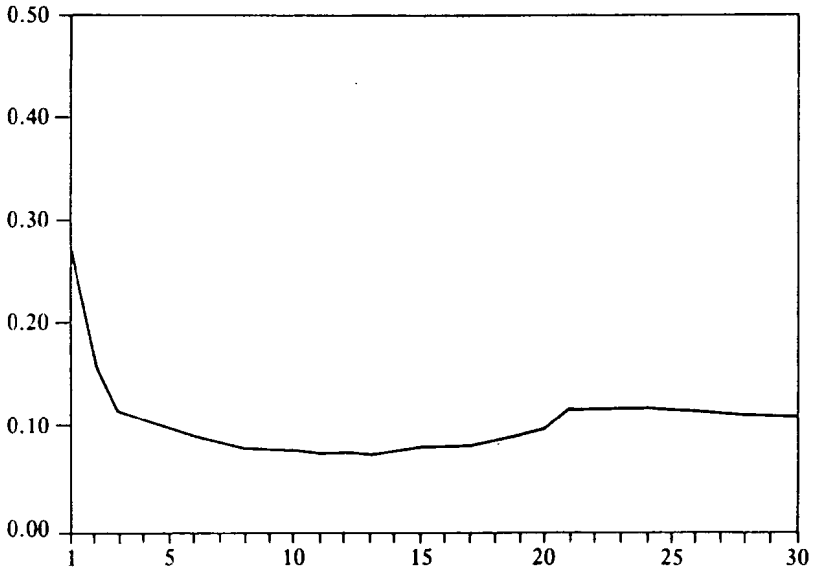
the entire graph would fall to a lower level, but the peak in the first year would remain.

The peak arises because surrender revenue and mortality gains are both at their maximum in the first year. This is a reflection of the company's actual mortality charges and the relatively high first-year lapse rate.

In contrast with the premium method, the earnings do not fall after premiums cease; they continue at a fairly stable level after the first two or three years.

GRAPH 2

RETROSPECTIVE DEPOSIT METHOD



t	*tDAC*	*tV*	*t E'*
1	8.47	9.12	0.279
2	8.93	13.65	0.168
5	10.27	30.22	0.103
10	13.24	71.15	0.083
15	18.57	136.49	0.083
20	24.00	238.55	0.101
25	20.45	364.21	0.122
30	0.00	564.91	0.116

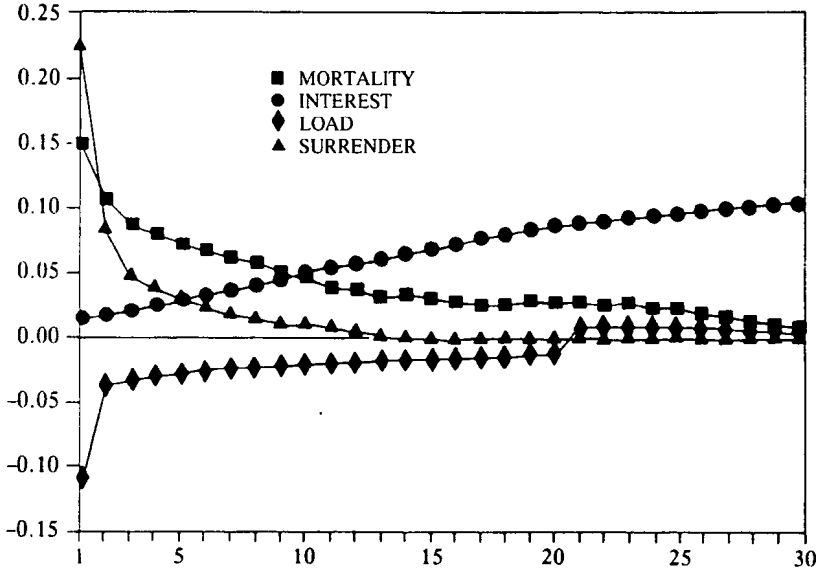
The DAC factor compared to the premium method is very high and increases for most of the thirty-year projection period; yet this method is conservative relative to the premium method, since earnings are clearly deferred to a greater extent.

Graph 3 is the same as Graph 2, except that the sources of earnings are shown separately. The patterns here are fairly typical.

Prospective deposit method: Graph 4 shows the prospective deposit (or full release from risk) method. In this example all assumptions were equal

GRAPH 3

RETROSPECTIVE DEPOSIT METHOD
SOURCES OF EARNINGS



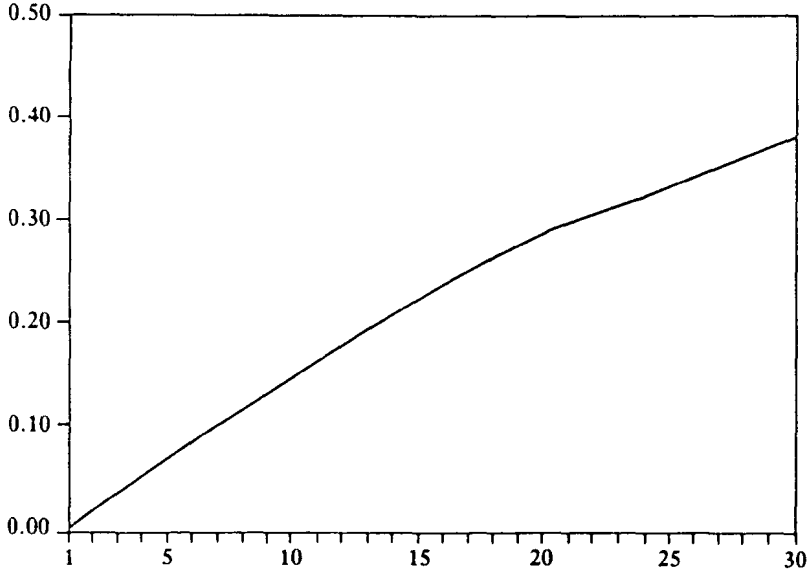
t	*MORT*	*INT*	*LOAD*	*SURR*
1	0.150	0.016	−0.113	0.226
2	0.105	0.017	−0.039	0.085
5	0.072	0.028	−0.029	0.033
10	0.045	0.049	−0.022	0.011
15	0.031	0.068	−0.016	0.000
20	0.027	0.087	−0.012	0.000
25	0.022	0.095	0.005	0.000
30	0.007	0.105	0.004	0.000

to GAAP assumptions except for interest. The entire provision for adverse deviation necessary to cause the net premium to equal the gross was added to the interest assumption. In this case a level 73 basis point spread had the desired effect.

Earnings are very low in the first year since there are no margins other than interest, and the interest spread applies to a very small net liability. Thereafter earnings increase as the net liability increases.

GRAPH 4

PROSPECTIVE DEPOSIT METHOD
INTEREST MARGIN ONLY



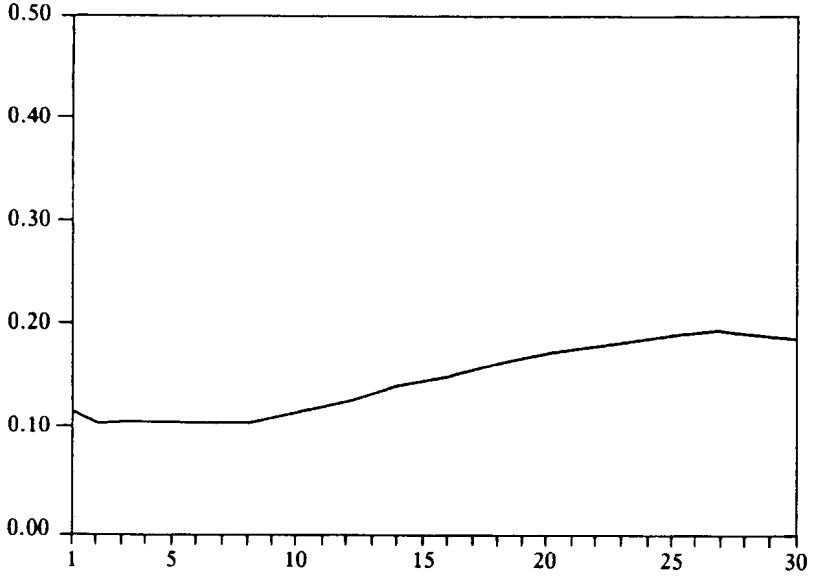
t	*tDAC*	*tV*	*t E'*
1	7.37	8.25	0.008
2	7.74	13.03	0.026
5	7.74	29.21	0.073
10	6.70	67.84	0.154
15	4.66	127.69	0.226
20	0.00	221.15	0.295
25	0.00	350.41	0.338
30	0.00	564.91	0.389

Graph 5 is the same as Graph 4 except that margins were added to the mortality assumption as well as the interest assumption. The mortality load was an additional 33.33 percent level in all years. This reduced the interest margin needed to 17 basis points.

It seems that with this method relatively small changes in the interest margins cause relatively large changes in the net premium and the earnings pattern.

GRAPH 5

PROSPECTIVE DEPOSIT METHOD
INTEREST AND MORTALITY MARGIN



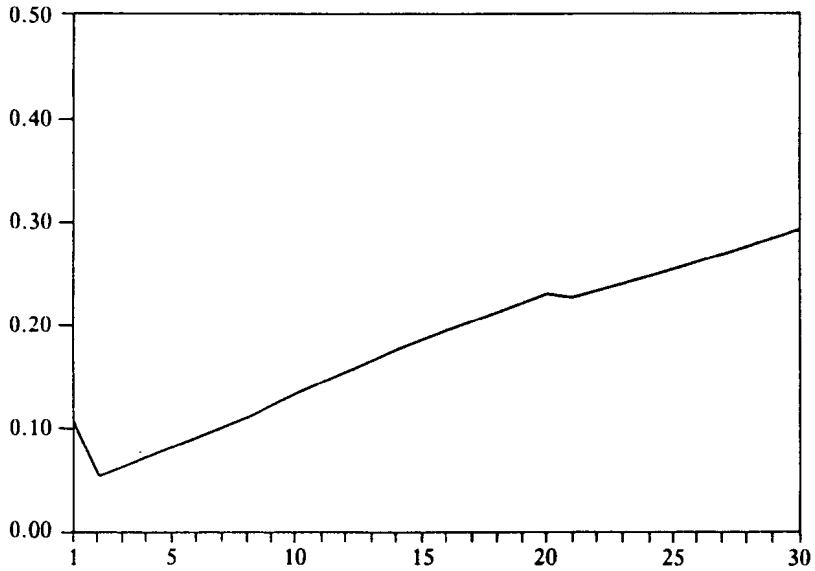
t	*tDAC*	*tV*	*t E'*
1	7.33	8.05	0.115
2	7.70	12.66	0.106
5	7.71	28.24	0.106
10	6.72	65.85	0.117
15	4.70	124.43	0.150
20	0.00	216.67	0.176
25	0.00	345.85	0.194
30	0.00	564.91	0.191

The composite method: Graph 6 shows a composite method. Approximately 25 percent of total earnings (i.e., 1 percent of gross premiums) were allowed to emerge in proportion to gross premiums. Assumptions were chosen such that the total net premium was 99 percent of the gross. All remaining earnings arise out of the interest margin, which was 56 basis points. The resulting earnings are intermediate between the prospective deposit method and the premium method.

Graph 7 is also the composite method. About 50 percent of total earnings were allowed to emerge in proportion to gross premium, i.e., the net pre-

GRAPH 6

COMPOSITE METHOD
NET/GROSS 99%



t	*tDAC*	*tV*	*t E'*
1	7.36	8.09	0.106
2	7.73	12.78	0.056
5	7.73	28.68	0.082
10	6.71	66.76	0.136
15	4.67	125.89	0.185
20	0.00	218.63	0.233
25	0.00	348.04	0.255
30	0.00	564.91	0.296

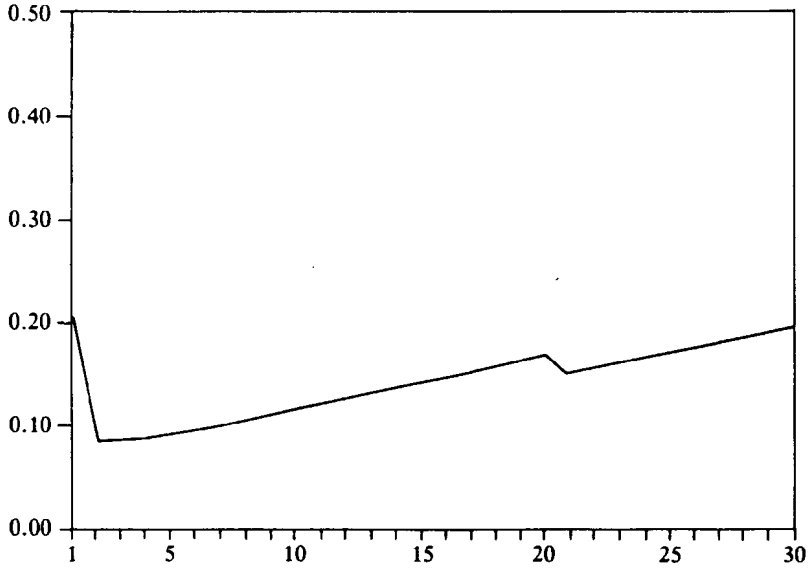
mium was 98 percent of the gross. Again, all remaining revenues arise out of the interest margin, which was 38 basis points. The results are intermediate between the preceding example and the premium method.

It seems that with this method, as with the full release from risk method, small changes in the interest margin have large effects. Changes to the premium-related proportion of the revenue also have large effects.

Note that, for examples 4 through 7, the DAC amortization schedules are similar but not identical to the schedule for the premium method.

GRAPH 7

COMPOSITE METHOD
NET/GROSS 98%



t	*tDAC*	*tV*	*t E'*
1	7.35	7.93	0.203
2	7.71	12.54	0.087
5	7.72	28.15	0.092
10	6.71	65.66	0.118
15	4.69	124.07	0.143
20	0.00	216.06	0.170
25	0.00	345.60	0.171
30	0.00	564.91	0.199

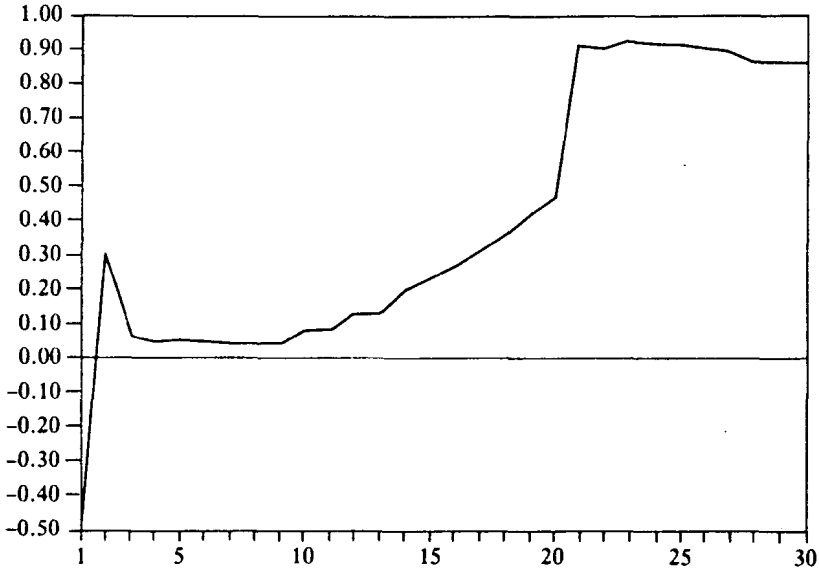
Other methods: Graphs 8, 9, and 10 are examples of simplified methods being used in practice. They are not considered theoretically sound.

In Graph 8 the account value is held as the benefit reserve, but DAC is amortized in proportion to premiums. The amortization is more rapid than is proper, resulting in depressed earnings in the early years. The scale of this graph is different from the others in order to show the wider range of earnings by year.

Graph 9 is a second simplified methodology used by those believing that surrenders are a major source of revenue. In order to recognize surrender

GRAPH 8

SIMPLIFIED METHOD 1



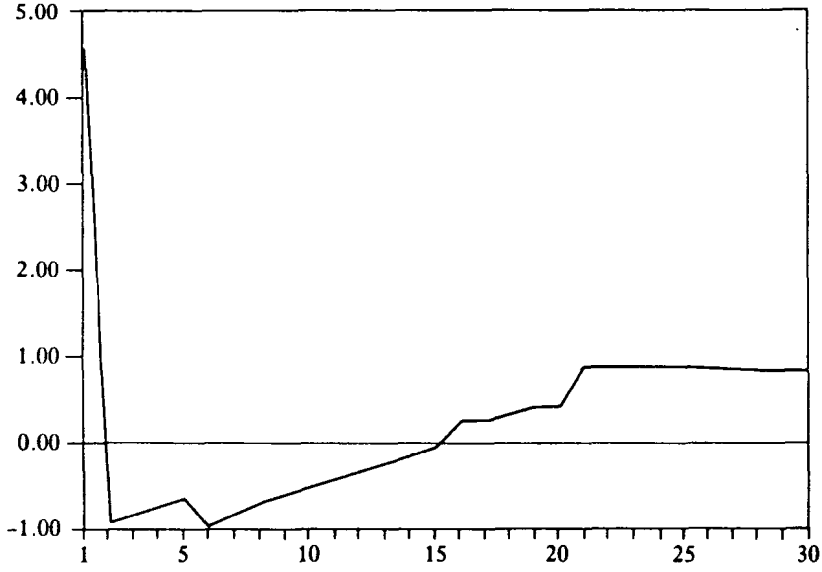
t	*tDAC*	*tV*	*t E'*
1	7.33	9.12	−0.487
2	7.69	13.65	0.297
5	7.71	30.22	0.052
10	6.72	71.15	0.081
15	4.72	136.49	0.224
20	0.00	238.55	0.473
25	0.00	364.21	0.917
30	0.00	564.91	0.870

revenue, the cash surrender value is held as the benefit reserve instead of the account value.

The resulting first-year earnings are high, but in subsequent years the increase in the surrender value is higher than the increase in the account value. As a result, earnings in several years after the first are negative. Discontinuities in the earnings pattern arise from the scale of surrender charges.

GRAPH 9

SIMPLIFIED METHOD 2



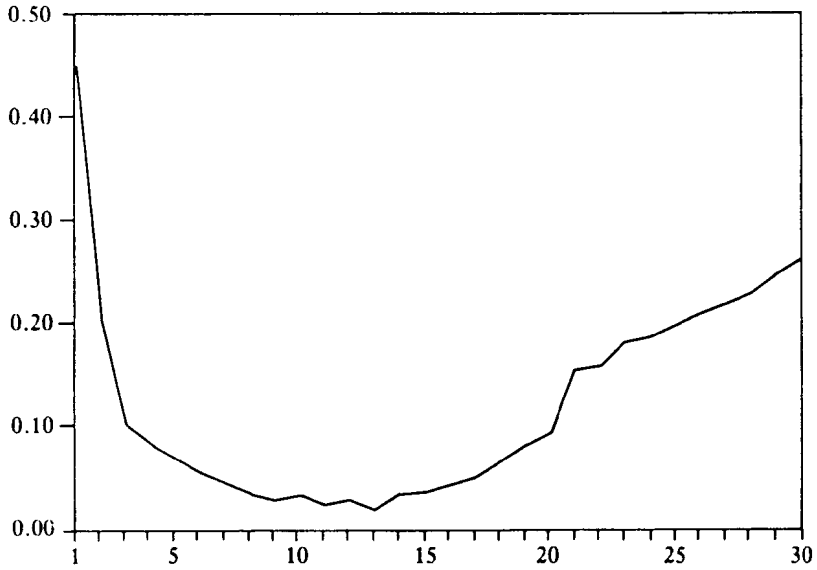
t	*tDAC*	*tV*	*t E'*
1	7.33	1.53	4.616
2	7.69	6.06	−0.930
5	7.71	22.63	−0.636
10	6.72	67.36	−0.490
15	4.72	136.49	−0.009
20	0.00	238.55	0.473
25	0.00	364.21	0.917
30	0.00	564.91	0.870

In Graph 10 the retrospective deposit method was followed most of the way. The company illustrated a credited interest rate of 10 percent on the account value, but apparently lacked the conviction that 11.5 percent interest should accrue to the DAC. It was decided to use 8 percent interest in order to be conservative.

Instead of being conservative, the lower rate of interest shifted more weight to the revenue earned in the later years. Although less interest accrued, there was also less amortization in the early years, with the net effect that the

GRAPH 10

SIMPLIFIED METHOD 3



t	*tDAC*	*tV*	*t E'*
1	8.71	9.12	0.445
2	9.30	13.65	0.206
5	10.75	30.22	0.071
10	13.52	71.15	0.034
15	17.97	136.49	0.037
20	21.72	238.55	0.098
25	17.42	364.21	0.200
30	0.00	564.91	0.263

DAC actually was higher in the first ten years than it should have been. Earnings were shifted away from the middle years to the early and late years.

In these examples and others, it was found that relatively wide swings in the earnings pattern could arise from relatively small changes in assumptions. It would be prudent to carefully test the actual effects of the assumptions used in any method, but especially with the prospective deposit method.

APPENDIX II

This appendix covers recent developments in FASB deliberations on universal life GAAP accounting. The tentative decision has been reached that the composite method likely will not be acceptable. Instead it appears that the retrospective deposit method will be prescribed.

The retrospective deposit method, however, may be approved with some modifications.

One tentative decision is that the DAC should be amortized without interest. Graph 10 of Appendix I is an illustration of the earnings pattern when DAC is amortized with an interest rate lower than the GAAP interest rate. If that graph were modified to zero interest instead of 8 percent as shown in Exhibit 1, earnings would be shifted to the beginning and end of the period to an even greater extent. Earnings in the middle years would become negative.

A second tentative decision is that surrender revenues should directly amortize DAC rather than be included in the revenue stream. This is shown in Exhibit 2. Since surrender revenues are generally larger in the earlier policy years, the effect will be to amortize the DAC more quickly than if the present value of those revenues increased the revenue stream. Earnings will be shifted toward the later policy years. Exhibit 2 shows this modified method with earnings almost level in all years. For this sample policy, this earnings pattern seems the most desirable.

Exhibit 3 shows the combined effects of implementing both of these changes. The zero interest rate shifts the weighting of amortization revenue to later years, except for surrender revenue. The rapid amortization of the DAC by the surrender charge is not compensated for by the accrual of interest. Consequently, earnings are excessively shifted toward the later years.

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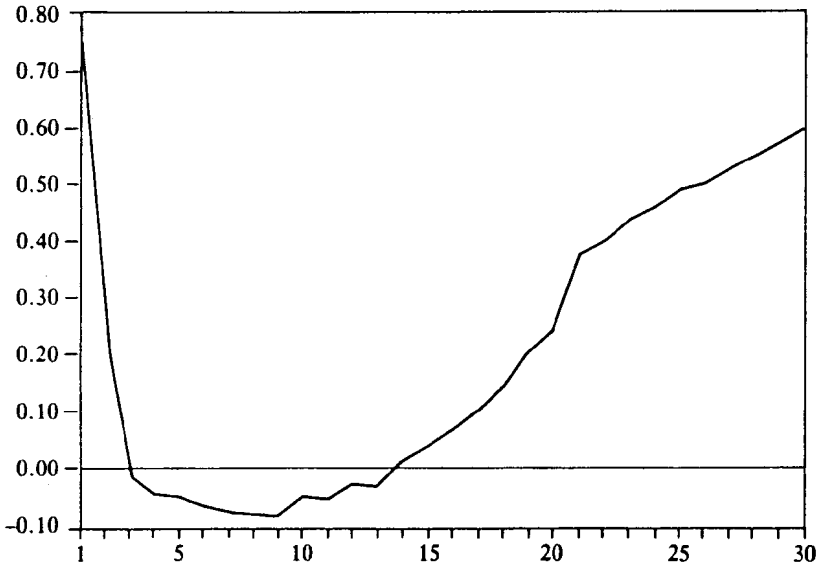
EXHIBIT 1

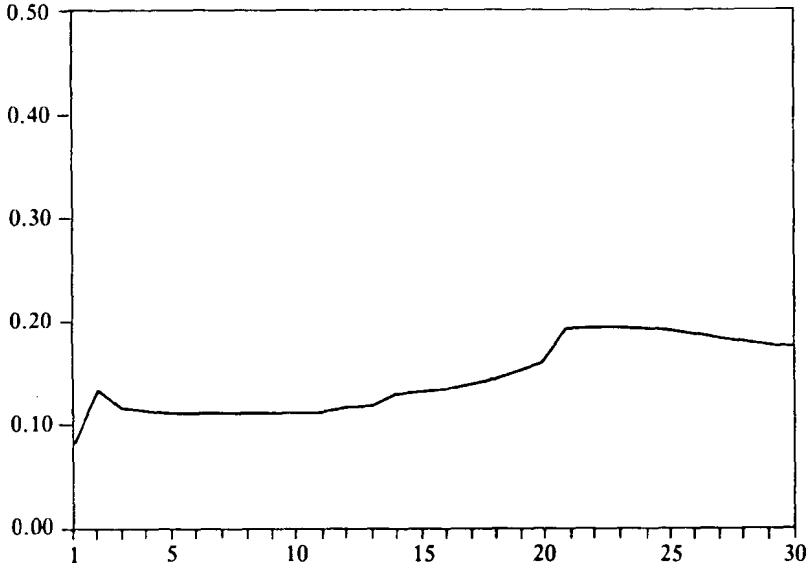
FASB PROPOSED METHOD
ZERO INTEREST



t	*tDAC*	*tV*	*t E'*
1	9.17	9.12	0.751
2	9.89	13.65	0.212
5	10.93	30.22	−0.050
10	11.94	71.15	−0.052
15	13.16	136.49	0.040
20	13.03	238.55	0.248
25	8.81	364.21	0.500
30	0.00	564.91	0.605

EXHIBIT 2

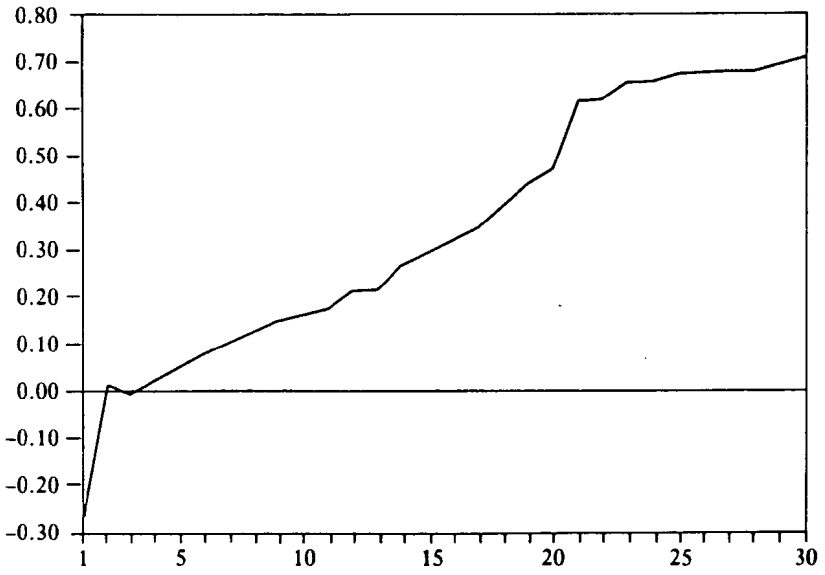
FASB PROPOSED METHOD
SURRENDER METHOD



t	*tDAC*	*tV*	*t E'*
1	8.18	9.12	0.085
2	8.50	13.65	0.135
5	9.56	30.22	0.113
10	12.08	71.15	0.115
15	16.83	136.49	0.133
20	21.75	238.55	0.163
25	18.53	364.21	0.196
30	0.00	564.91	0.186

EXHIBIT 3

FASB PROPOSED METHOD
SURRENDER OFFSET AND 0% INTEREST



t	*tDAC*	*tV*	*t E'*
1	7.66	9.12	−0.262
2	7.62	13.65	0.006
5	7.31	30.22	0.044
10	6.98	71.15	0.163
15	7.34	136.49	0.298
20	7.27	238.55	0.476
25	4.91	364.21	0.684
30	0.00	564.91	0.722

DISCUSSION OF PRECEDING PAPER

DONALD R. SONDERGELD:

My comments will relate mostly to Section III of this paper. In what follows, a pretax basis is assumed.

I relate "earnings" to a period of time and "book profits" to a point in time (such as beginning, middle or end of year). Earnings are not necessarily adjusted for the timing of cash flows, whereas book profits are. However, statutory earnings for a year can equal book profits at the end of the year. The present value at issue of statutory book profits, or earnings, is unaffected by the size of the statutory reserve if the discount rate is the rate earned on the reserve. Nevertheless, the size of the statutory earnings each year and the sum of the statutory earnings reported over the life of the policy are affected by the size of the statutory reserve because more interest is earned on the larger reserve. And the GAAP earnings reported over the life of the policy must equal the total of the statutory earnings reported.

Under "traditional" GAAP, profits emerge in proportion to premiums, assuming no margin for adverse deviation. The sum of GAAP earnings equals the sum of statutory earnings over the life of a policy. However, expected GAAP "profits" (not earnings) are proportional to premiums. GAAP earnings are proportional to premiums only if the GAAP interest rates are zero. If one wanted to produce GAAP earnings that were proportional to premiums, one need only obtain the present value (at 0 percent) of statutory earnings and the present value (at 0 percent) of premiums. The ratio of the former to the latter would be the uniform ratio of GAAP earnings to premiums.

However, with the traditional, or premium, method one normally uses a nonzero GAAP discount rate. The present value of statutory earnings and premiums are calculated using GAAP interest rates. The end result is that GAAP earnings equal GAAP book profits plus GAAP interest on the GAAP adjustments. The GAAP adjustments generally equal DAC less GAAP benefit reserves plus statutory benefit reserves. (See my paper "Profitability as a Return on Total Capital," *TSA*, XXXIV, and my discussion of Bradley Smith's paper "Pricing in a Return on Equity Environment," *TSA*, XXXIX.) Apparently, what I call GAAP book profits is what the author labeled GAAP earnings. This is borne out by the statement at the end of Section III where the author states the

> . . .expected earnings are zero after the end of the premium paying period [of a limited payment life policy]. . . .

Yes, future expected book profits are zero, but if statutory reserves are greater than GAAP benefit reserves, future expected GAAP earnings will equal the interest on the GAAP adjustment.

The author has compared what I call GAAP book profits for universal life by a number of methods. What the methods have in common is use of the same present value. An additional set of comparisons that the author may wish to include is GAAP earnings, under these methods, that include interest on the GAAP adjustments. Then the sum of those earnings over the policy life would be equal under all methods.

MARK D.J. EVANS:

Mr. McLaughlin has written an informative paper presenting the basic issues surrounding a complex subject. The purpose of this discussion is to offer some additional insights, perhaps from slightly different perspectives.

The first paragraph in the Introduction mentions growing concern about the appropriateness of the receipt of premium as the revenue measurement basis for universal life. There is, however, a significant body which endorses GAAP methods quite similar to those used for traditional life insurance products.[1] It is impossible to say which viewpoint is predominant in our profession.

With respect to the retrospective desposit method, it is important to note that under this aproach the assumptions used to calculate GAAP benefit reserves and expense assets and the product design of the account value could be constructed so that revenues would be skewed toward the earlier durations. Unless adequate provisions for adverse deviation were made at the later durations, the retrospective deposit method could potentially be unduly aggressive. The FASB proposal for reporting universal life on a GAAP basis prohibits provisions for adverse deviation.

The sources of earnings approach developed in the paper is a very helpful analysis as it develops a single common framework for various methods.

In Appendix I Mr. McLaughlin provides graphical representation of some useful and interesting results. In analyzing these results, however, one must consider factors not explicitly mentioned in the paper. The primary issue here is that Mr. McLaughlin related earnings to the units issued. Under Mr. McLaughlin's scenario the in-force business at the end of 30 years is less than 5 percent of the original units issued. Thus, relating profits earned to such a small portion of the original base may not be meaningful. Relating

[1]American Council of Life Insurance General Bulletin No. 376, April 23, 1987.

annual profits to a beginning-of-year measurement of in-force business may be more relevant. The point is that the measurement chosen is somewhat arbitrary and therefore one must consider the implications and ramifications of that choice.

For instance, in Mr. McLaughlin's discussion of the premium-method earnings shown in graph form, he mentioned a typical declining pattern with a larger than normal profit in the first year arising from the lump-sum deposit. However, if this same calculation was based on a beginning-of-year measurement, then ignoring any difference between actual experience and GAAP experience the resulting profits would be constant in relation to the beginning-of-year in-force business except, of course, for the first year when profits would be twice as high.

There are some advantages of the premium method not mentioned in the paper. First of all, it does produce a smooth earnings pattern as a percentage of premium income. This allows profits to be discussed in terms which facilitate ease of communication to management. Some of the other methods involve concepts, relationships, and dynamics which are much more difficult to use. If an insurance company is to make a profit, it needs to bring premium income into the organization. It must obtain this premium from consumers' disposable income, competing with other opportunities presented to consumers to part with their money. The extent to which a company succeeds in this endeavor is clearly measured by premium income. The fruits of this effort are logically represented by relating profits to premium income. Another logical reason to relate some or all of earnings to premium income is based upon the fact that efforts aimed at encouraging policy persistency are a service provided by the insurance company. Persistency affects the level of premium income and good persistency also usually results in better profits. Thus the effects of efforts to encourage persistency are arguably best measured as a percentage of premium income.

Any reasonable method can look good or bad depending on how it is employed. In certain situations expressing profits as a percentage of premium will work reasonably well. For example, if a company markets and services its universal life products primarily as whole life plans with level premiums payable for life, then reflecting profits as a percentage of premium would not appear to be objectionable. However, if a company or product has erratic premium payment patterns (this would include initial lump-sum deposits) in the aggregate from a group of consumers, then the appropriateness of expressing income as a level percentage of premium can be called into question. Similarly, under a retrospective deposit or similar method, the product

can be designed and the margins for adverse deviations can be set in such a way to produce disturbing results. It is desirable to find one method which works well in a wide range of situations. Perhaps this can be best accomplished by a flexible method, such as one in which certain parameters are allowed to vary, enabling it to adapt to various situations in a reasonable fashion.

In Graphs 8, 9, and 10 and associated discussions, Mr. McLaughlin does a nice job of delineating some of the differences between theoretically sound methods and methods of questionable appropriateness. A few additional comments explaining the reason for some of the behaviors observed may be helpful.

In Graph 8 a method is presented where the account value is held as the benefit reserve and the DAC is amortized in proportion to premiums. The only way this method could produce acceptable results would be if the account value coincidentally happened to mimic the behaviors of a benefit reserve calculation. Unfortunately this is not likely to happen. For example, the calculation of the fund value implicitly assumes a lapse rate of zero, unlike a benefit reserve calculation.

An analogy applicable to the concepts expressed in Graph 9 can be obtained by considering how a minimum cash value traditional policy, where deferred acquisition costs were amortized in proportion to premium, would have net level premium GAAP benefit reserves that would typically be much larger than cash surrender values for many years. Thus, using cash surrender values as a proxy for GAAP benefit reserves can be expected to produce inadequate GAAP benefit reserves for universal life plans with significant surrender charges.

In Graph 10, Mr. McLaughlin studies the case where the interest rate used in the deferred acquisition calculation is less than the interest rate used to calculate the benefit reserve and account value. An easy way to gain insight into the problems with this is to consider that the money used to fund deferred acquisition costs is, in effect, borrowed from surplus or some outside source. In this situation the deferred acquisition cost could be considered analogous to an outstanding loan that was being repaid at 8 percent interest. Of course this would be a bargain basement rate if surplus could be invested at interest rates consistent with an 11.5 percent benefit reserve assumption. As a matter of fact, if the benefit premium is calculated at 11.5 percent but the expense premium is based on an 8 percent interest rate, then one could have a situation where the benefit premium plus the expense premium was less than the gross premium; however, if a gross premium valuation was done based

on a common interest rate, the block of business could actually be in a loss recognition status even though the "calculated GAAP" premium was less than the gross.

In Appendix II Mr. McLaughlin briefly discusses the FASB proposal. He mentions the most questionable portion of the FASB proposal, the zero interest rate. The use of 100 percent of the surrender revenues to amortize deferred acquisition costs does not create the theoretical anomalies a zero percent interest rate does, although philosophical problems arise. Assuming surrender charges are intended to recoup acquisition costs as opposed to interest margins, expense margins, or mortality margins is somewhat arbitrary. This can cause the earnings reported on given products to be particularly sensitive to plan design as opposed to the true long-term economic value inherent in the products. In fact, one difficulty with the FASB proposal not highlighted in the paper is that the earnings emergence patterns produced by this method are very sensitive to plan design.

(AUTHOR'S REVIEW OF DISCUSSION)

S. MICHAEL MCLAUGHLIN:

I would like to thank the discussants for their thoughtful comments, which enhance the value of this paper. Mr. Sondergeld's comments appear to imply that GAAP earnings are somehow dependent on the prior calculation of statutory earnings. He states that statutory earnings are affected by the size of the statutory reserve, but that GAAP earnings are equal to the statutory earnings reported. He later discusses earnings including interest on the GAAP adjustments, which again refers to statutory reserves in determining GAAP earnings. While it is possible to define earnings in various ways, I do not believe that a definition in which GAAP earnings are dependent on statutory reserves aids clear comprehension.

It may be that Mr. Sondergeld intends earnings to mean book profits plus interest on equity. If equity means the accumulated book profits of prior years and if we calculate the sum of earnings thus defined, we arrive at the sum of book profits plus accumulated interest on those profits. This is equivalent to the accumulated value of book profits.

"Earnings," as used in my paper, is defined in Section III. Restated, earnings equal cash flow adjusted for the timing of events and for reserve changes. The present value (and the accumulated value) of earnings is unaffected by intervening reserve values regardless of the discount rate used. Therefore the sum of statutory book profits plus interest on equity is the

same as the sum of GAAP book profits plus interest on equity, and this is true whatever the definition of GAAP reserves.

I confess that I wrestled with the question of whether to use "book profits," "earnings" or "income" in writing this paper. In fact an early draft used "profits" for "earnings" throughout. I selected "earnings" and provided a definition in an attempt to distinguish between (a) expected earnings according to the GAAP mechanism, (b) actual earnings realized when experience differs from expectations, and (c) profits, which differ from actual earnings due to the existence of certain expenses which are not affected by the GAAP mechanism, in particular nondeferrable acquisition expenses and overhead expenses.

If federal income tax is considered, complications arise since a tax rate may be applied either to cash flows or to the discount rate. The above relationships may not apply. To limit the scope of this paper, I deliberately ignored tax situations.

With regard to Mr. Evans' comments, at the outset it was not my intention to recommend one method over others, nor did it intend to state which method was predominant. It was my intention to objectively expose each method and to demonstrate the relationships between each in order to aid understanding of the subject and to allow the reader to better evaluate the various methods.

As the source of earnings (SOE) approach, Section VIII, emerged, it appeared to unify and encompass several other methods, which could then be regarded as special cases of a broader method. Both the premium and retrospective deposit methods are encompassed by SOE. The release from risk method belongs to a different "family" and yet the composite method is closely related to both the prospective deposit method and the premium method.

Mr. Evans correctly points out that the retrospective deposit method can be manipulated by GAAP assumptions and plan design. This is also true of other methods including the premium as revenue method (since premiums may be flexible in amount, or limited in duration). In fact the last paragraph of Appendix I cautions that relatively wide swings in the earnings pattern could arise from relatively small changes in the assumptions. The prospective deposit method appears more sensitive in this regard than other methods.

Mr. Evans discusses the graphical presentation. As with terminology, a difficult choice had to be made here, between earnings per unit issued or per unit in force. An early draft used per unit in force, but finally earnings

were related to per unit issued in order to produce graphs with a consistent scale, as far as possible.

In his comments on Appendix II Mr. Evans adds a valuable point that the separation of surrender charges from other sources of revenue sensitizes the FASB proposed method to the effects of varying plan design. In fact it would appear that, if this aspect of the Exposure Draft is preserved in the final statement, actuaries will need to be keenly aware of the implications of plan design decisions on the financial statements of their companies.