TRANSACTIONS OF SOCIETY OF ACTUARIES
1983 VOL. 35

APPLICATION OF GENERALLY ACCEPTED ACCOUNTING PRINCIPLES TO ANNUITIES

CAROL A. MARLER

ABSTRACT

Since the AICPA published its *Audit Guide for Life Insurance Companies*, a number of changes have taken place in the life insurance marketplace. Some of the nontraditional products now being offered by life insurance companies have called into question the definition of revenues as being related solely to premium income. Other items that could be used to allocate revenues (and profits) properly include sales loads, investment income, assets, or some combination of these items, either with or without premium income.

This paper explores a reserving technique in which profits are recognized as a percentage of assets. This technique is applied to two hypothetical flexible premium annuity products. Examples are provided that show the emergence of profit when experience assumptions are met, and the effect on profit patterns when actual experience deviates from that assumed in setting the reserves.

1. INTRODUCTION

The basic principle underlying the use of generally accepted accounting principles (GAAP) reserves is the concept that profit should be recognized in proportion to revenues. The AICPA *Audit Guide for Life Insurance Companies* has taken the position that, in general, revenues should be considered as equal to premium income. This paper will explore a more general definition of revenue, which is better suited to the nature of flexible premium retirement annuities.

For term insurance it is clear that premium income is the only significant item of revenue. For other traditional products of the life insurance industry, from whole life through limited payment life, endowment insurance, and annual premium annuities, premium income remains a significant element of revenue. In addition, for these traditional products, pricing assumptions generally involve a simple assumption as to the level of investment income, and departures of actual experience from that assumption will be recognized as gain or loss to the insurance company.

Changes in the investment earnings do not, in general, produce any changes in the benefits available under traditional nonparticipating insurance policies and annuity contracts.

However, the insurance industry is entering an era of change. The high interest rates available in other financial institutions, the critical comments of consumerists, and the requirements of cost disclosure are all forcing companies to reexamine their traditional products.

In the 1970s, in response to these changes, some companies introduced a new kind of product, called a flexible premium retirement annuity (FPRA). This product included some of the features of variable annuities, but combined them with significant guarantees and nonforfeiture values similar to those of traditional fully insured annuity products.

The flexible annuity product is still being refined and developed. In particular, the pricing assumptions and profitability measures chosen for these products are being reexamined. In terms of GAAP reporting, it appears that a new definition of revenues may be called for, in order to recognize more fully the investment management features of these products.

A key feature of the design of these products is the concept that the interest rate applied to the accumulation value will reflect the company's best estimate of its expected investment experience in the near future. Long-range trends in investment experience will be recognized as they emerge. Thus, changes in the level of investment income (from that originally assumed in pricing) will flow through into contract holder benefits and will not produce investment gains or losses unless the interest rate guarantees are invoked. Clearly, for such a product design, investment income is a key element in defining revenues. Furthermore, only a small proportion of the premium paid by the contract holder is used to support guarantees of principal, interest, and mortality. The charges for these guarantees are included in the pricing, either explicitly in determining the loads applied against premium, or implicitly by increasing the spread between interest earned and the interest rate credited to accumulation values. Such an approach to pricing makes a strong case for the assertion that the load and investment income are the true revenues for such products.

II. A NEW MEASURE OF "REVENUES"

When FPRAs were introduced, many companies selected a profit objective that was expressed as a percentage of premiums. This approach was suggested by analogy with profit objectives for traditional life insurance products. A profit objective expressed as a percentage of premium

gives a standard that is directly comparable to the current GAAP philosophy, which also attempts to recognize profit as a percentage of premium.

However, there are many alternatives that may be used as a basis for profit recognition. By analogy with variable annuities, one can select a profit objective that is expressed as a percentage of assets. One advantage to this approach is the fact that the credited interest rate can be defined by applying a series of deductions to the applicable gross investment income rate.

It is already customary to express investment expenses as a percentage of assets. Other expenses for the flexible annuity product can also be expressed in this way. For contracts that deduct an administrative load from premiums, only the excess of expenses over loading need be applied as a percentage of assets. The charges for guarantees and required profit can also be expressed in this way. The investment rate to be credited to the contract is then equal to the gross investment interest rate minus a set of deductions, all expressed by the common unit, percentage of assets.

Under such a pricing scheme, the interest assumption used by the actuary no longer needs to be stated as a specific pattern of interest rates expected in the future. Rather, the actuary assumes that a constant margin will be maintained between the interest rates earned by the company and the interest rates credited to accumulation values. So long as the margin remains equal to the original assumption, there will be no interest gains or losses. This approach frees the actuary from the need to predict the pattern and timing of changes in interest rates over the long-term future. In the present period of volatile interest rates, this can be a significant advantage.

When pricing methods relate profit objectives to assets, then GAAP reserves should also provide recognition of profit as a percentage of assets. It could be argued that this is not a precise matching to revenues if revenues are defined as loading (or surrender charges) plus investment income. However, it happens that the use of a measure defined as a percentage of assets simplifies the computation of factors. Furthermore, the percentage-of-assets approach preserves a desirable feature of the pricing approach, namely, that specific levels of interest rates need not be predicted into the distant future.

III. EXAMPLES

This paper presents the development of flexible annuity GAAP factors on the basis just described. Reserves are first derived for a simple, hypothetical product on which loading exactly matches expenses. The analysis is then extended to consider the features of more complex products.

A. *Case I: Load Equals Expenses*

Consider an annual premium flexible annuity product that has pricing assumptions as follows:

1. Commission—first year, 25 percent; renewal, 5 percent.
2. Administrative expenses—first year, 5 percent; renewal, 2.5 percent.
3. Load—first year, 30 percent; renewal, 7.5 percent.
4. Current investment income net of investment expenses—12 percent.
5. Interest rate on cash value—10 percent.
6. Required profit margin, including risk charges—2 percent of assets.

First, assume that there are no withdrawals, surrenders, or suspensions of premium. Table 1 analyzes experience under these assumptions. Column 2 is premium income, column 3 is commission and administrative expense, column 4 is interest credits, and column 5 is required profit. Column 6 is the experience fund, computed by taking column 6 for prior year plus column 2 minus column 3, plus column 4 and minus column 5. For comparison, column 7 is the cash value calculated by deducting the load and accumulating at the appropriate interest rate. A comparison of column 6 and column 7 shows that the required profit margin will be produced in the company statement if GAAP reserves are equal to the cash value.

Table 2 brings in the effect of persistency, by assuming that premium income decreases 10 percent each year per policy in force, while 2 percent of the annuitants surrender their contracts for cash. Column 2 is premium income, column 3 is administrative expense, column 4 is cash surrender benefits, column 5 is interest earned, and column 6 is the required profit.

TABLE 1

EXPERIENCE OF FPRA ASSUMING NO WITHDRAWALS, SURRENDERS, OR SUSPENSIONS OF PREMIUM

Policy Year (1)	Premium Income (2)	Commission and Expense (3)	Interest Earned (4)	Required Profit (5)	Experience Fund (6)	Cash Value (7)
1	$100.00	$30.00	$ 8.40	$ 1.40	$ 77.00	$ 77.00
2	100.00	7.50	20.34	3.39	186.45	186.45
3	100.00	7.50	33.47	5.58	306.84	306.84
4	100.00	7.50	47.92	7.99	439.28	439.28
5	100.00	7.50	63.81	10.64	584.96	584.96
6	100.00	7.50	81.29	13.55	745.20	745.20
7	100.00	7.50	100.52	16.75	921.47	921.47
8	100.00	7.50	121.68	20.28	1,115.37	1,115.37
9	100.00	7.50	144.94	24.16	1,328.66	1,328.66
10	100.00	7.50	170.54	28.42	1,563.27	1,563.27

Column 7 is the experience fund, and again we see that GAAP reserves for this product should be equal to the cash value, shown in column 8.

Finally, Table 3 shows the effect of interest rates that vary by duration. Earned interest rates are assumed to begin at 12 percent in the first year, decreasing by 0.25 percent each year thereafter. Interest rates credited to cash value are lower than earned rates by 2 percentage points. Columns 2–8 have the same definitions as in Table 2. Again the results show that GAAP reserves should equal cash values in order to produce the required level of profit.

TABLE 2

EXPERIENCE OF FPRA ASSUMING PREMIUM REDUCTION OF 10 PERCENT AND SURRENDERS OF 2 PERCENT PER YEAR

Policy Year (1)	Premium Income (2)	Commission and Expense (3)	Surrenders Paid (4)	Interest Earned (5)	Required Profit (6)	Experience Fund (7)	Cash Value (8)
1	$100.00	$30.00	$ 1.54	$ 8.40	$ 1.40	$ 75.46	$ 75.46
2	88.20	6.61	3.45	18.85	3.14	169.29	169.29
3	77.79	5.83	5.31	28.95	4.83	260.07	260.07
4	68.61	5.15	7.12	38.82	6.47	348.77	348.77
5	60.52	4.54	8.90	48.57	8.10	436.32	436.32
6	53.38	4.00	10.69	58.28	9.71	523.58	523.58
7	47.08	3.53	12.48	68.05	11.34	611.36	611.36
8	41.52	3.11	14.29	77.97	13.00	700.45	700.45
9	36.62	2.75	16.16	88.12	14.69	791.60	791.60
10	32.30	2.42	18.07	98.58	16.43	885.56	885.56

TABLE 3

EXPERIENCE OF FPRA ASSUMING PREMIUM REDUCTION OF 10 PERCENT, SURRENDERS OF 2 PERCENT, AND INTEREST REDUCTION OF ¼ PERCENT PER YEAR

Policy Year (1)	Premium Income (2)	Commission and Expense (3)	Surrenders Paid (4)	Interest Earned (5)	Required Profit (6)	Experience Fund (7)	Cash Value (8)
1	$100.00	$30.00	$ 1.54	$ 8.40	$ 1.40	$ 75.46	$ 75.46
2	88.20	6.61	3.45	18.45	3.14	168.91	168.91
3	77.79	5.83	5.28	27.70	4.82	258.48	258.48
4	68.61	5.15	7.03	36.22	6.44	344.69	344.69
5	60.52	4.54	8.73	44.07	8.01	427.99	427.99
6	53.38	4.00	10.38	51.32	9.55	508.75	508.75
7	47.08	3.53	11.98	57.99	11.05	587.26	587.26
8	41.52	3.11	13.55	64.13	12.51	663.74	663.74
9	36.62	2.75	15.07	69.76	13.95	738.35	738.35
10	32.30	2.42	16.56	74.90	15.36	811.21	811.21

B. *Case II: No Load*

In general, expenses are not precisely matched to loads. An extreme example is the so-called no-load contract. The annuitant is not subject to an explicit charge for loading. However, the interest return on no-load contracts will be lower (other things being equal) in order to produce the required level of profits. For a hypothetical no-load product, we assume the following:

1. Commission—first year, 5 percent; renewal, 2 percent.
2. Administrative expense—first year, 4 percent; renewal, 2 percent.
3. Load—none.
4. Current investment income net of investment expenses—12 percent.
5. Required profit margin, including risk charges—1.75 percent of assets.
6. Profit-study period—ten years.
7. Premium persistency—10 percent reduction in premium income each year.
8. Surrender persistency—no withdrawals.

On the basis of these assumptions, profit objectives will be met over ten years if the interest rate credited to cash values is 9.44 percent. Table 4 shows the results if all assumptions are met. Because the incidence of expenses does not match revenue, if revenue is defined as a percentage of assets, the experience fund does not match the cash value except at the end of the tenth year. If the GAAP benefit reserve is set equal to the cash value, the balancing item will be the deferred acquisition expense asset. As a practical matter, the expense asset may be developed either by the worksheet method or by applying factors to the business in force.

TABLE 4

EXPERIENCE OF FPRA IF ALL ASSUMPTIONS ARE REALIZED

Policy Year (1)	Premium Income (2)	Commission and Expense (3)	Surrenders Paid (4)	Interest Earned (5)	Required Profit (6)	Experience Fund (7)	Cash Value (8)
1	$100.00	$9.00	$.00	$ 10.92	$ 1.59	$ 100.33	$ 109.44
2	90.00	3.60	.00	22.41	3.27	205.87	218.27
3	81.00	3.24	.00	34.04	4.96	312.70	327.52
4	72.90	2.92	.00	45.92	6.70	421.91	438.22
5	65.61	2.62	.00	58.19	8.49	534.60	551.39
6	59.05	2.36	.00	70.95	10.35	651.89	668.06
7	53.14	2.13	.00	84.35	12.30	774.95	789.29
8	47.83	1.91	.00	98.50	14.37	905.01	916.14
9	43.05	1.72	.00	113.56	16.56	1,043.33	1,049.74
10	38.74	1.55	.00	129.66	18.91	1,191.28	1,191.23

For flexible annuities, the best measure of business in force is probably the cash value. Expense assets, then, may be expressed as a percentage of the cash value.

IV. VARIANCE BETWEEN ACTUAL AND EXPECTED

Now let us examine what happens if experience does not match expectations. In previous calculations, the required profit was used to determine what reserve needed to be held. In this section, the reserve will be based on the assumptions of the previous section, and profit will emerge as the balancing item. Table 5 shows the results if the no-load product described above suffers withdrawals at a rate of 2 percent per year. Column 2, labeled "Preprofit Fund," shows the experience fund at the end of the year before profits are recognized. Column 3 shows the cash value, and column 4 shows the GAAP deferred acquisition expense asset, which was calculated as a percentage of the cash value. Column 5 shows the net effect of GAAP benefit and expense reserves. Column 6 shows the profit recognized under GAAP accounting. This profit is deducted from the fund (i.e., it is treated as a contribution to surplus or as a stockholder dividend). Column 7 shows the profit as a percentage of beginning-of-year assets.

Each year's unfavorable lapse experience reduces the profit in that year only. Table 6 is similar to Table 5, except that lapses are greater than expected only in the second year. When lapses return to the level used in setting reserves, profit expressed as a percentage of beginning-of-year assets, emerges at the anticipated level.

TABLE 5

EXPERIENCE OF FPRA ASSUMING SURRENDERS ARE GREATER THAN EXPECTED IN ALL YEARS

Policy Year (1)	Preprofit Fund (2)	Cash Value (3)	Expense Asset (4)	GAAP Reserve (5)	Profit (6)	Percent Profit (7)
1	$ 99.73	$107.25	$ 8.93	$ 98.32	$ 1.41	1.55%
2	200.67	209.62	11.91	197.71	2.96	1.62
3	298.79	308.26	13.95	294.31	4.48	1.65
4	395.15	404.20	15.04	389.15	6.00	1.66
5	490.75	498.41	15.18	483.23	7.52	1.68
6	586.53	591.80	14.33	577.47	9.06	1.70
7	683.40	685.20	12.44	672.76	10.64	1.71
8	782.23	779.42	9.47	769.95	12.28	1.72
9	883.86	875.22	5.34	869.88	13.98	1.74
10	989.13	973.32	0.00	973.32	15.81	1.75

Table 7 shows the effect of changes in the earned interest rate. For Table 7, the earned interest rate starts at 12 percent and decreases 0.25 percent each year, producing the following pattern: 12 percent, 11.75 percent, 11.5 percent, 11.25 percent, 11 percent, . . . , 9.75 percent. The interest rate credited to cash value starts at 9.44 percent and maintains a constant differential from the earned interest rate, declining 0.25 percent each year to a minimum of 7.19 percent. Surprisingly, the profit margin increases slightly. Why should this occur when interest experience is unfavorable?

The answer is that lower interest rates are not necessarily unfavorable to profit margins for this product. A change in interest rates in any year

TABLE 6

EXPERIENCE OF FPRA ASSUMING LAPSES ARE GREATER THAN EXPECTED IN SECOND YEAR ONLY

Policy Year (1)	Preprofit Fund (2)	Cash Value (3)	Expense Asset (4)	GAAP Reserve (5)	Profit (6)	Percent Profit (7)
1	$ 101.92	$ 109.44	$ 9.11	$ 100.33	$ 1.59	1.75%
2	204.77	213.90	12.15	201.75	3.02	1.62
3	311.31	320.97	14.52	306.44	4.86	1.75
4	420.03	429.45	15.98	413.47	6.56	1.75
5	532.22	540.36	16.46	523.90	8.32	1.75
6	648.99	654.70	15.85	638.85	10.14	1.75
7	771.51	773.50	14.05	759.46	12.05	1.75
8	900.99	897.82	10.91	886.91	14.08	1.75
9	1,038.70	1,028.74	6.27	1,022.47	16.23	1.75
10	1,185.99	1,167.41	0.00	1,167.41	18.58	1.75

TABLE 7

EXPERIENCE OF FPRA ASSUMING EARNED INTEREST IS LOWER THAN EXPECTED

Policy Year (1)	Preprofit Fund (2)	Cash Value (3)	Expense Asset (4)	GAAP Reserve (5)	Profit (6)	Percent Profit (7)
1	$ 101.92	$ 109.44	$ 9.11	$ 100.33	$ 1.59	1.75%
2	208.67	217.77	12.37	205.40	3.27	1.75
3	315.72	325.48	14.73	310.75	4.97	1.75
4	423.57	433.00	16.12	416.88	6.69	1.76
5	532.65	540.69	16.47	524.22	8.43	1.76
6	643.36	648.86	15.71	633.15	10.21	1.76
7	756.00	757.74	13.76	743.98	12.02	1.76
8	870.86	867.52	10.54	856.98	13.88	1.76
9	988.13	978.31	5.97	972.34	15.79	1.76
10	1,107.97	1,090.18	0.00	1,090.18	17.79	1.76

produces a multiplicity of effects, both in that year and in the years following. Some of the parameters that are affected are the following

1. Total assets, current and future years.
2. Interest earned, current and future years (due to change in asset level).
3. Cash value, current and future years.
4. Interest on "borrowed" funds representing the expense asset.
5. Expense asset held in current and future years (since it is calculated as a percentage of cash value).

The additional profits emerging in Table 7 reflect the reduced interest charges of item 4 above. In fact, except for the effect on unamortized expenses, it would be accurate to say that the original interest assumption was met, for the assumption was expressed as a difference between earned and credited interest rates.

Table 8 shows that, if the original interest assumption is experienced in all years except the third, profit is reduced in the third year when higher interest is experienced. Thereafter, the profit margin continues to follow the pattern anticipated in pricing.

The results of this section suggest that, for no-load products, the actuary should attempt to use his best estimate for future interest levels, because of the relationship between assumed interest and the pattern of deferred policy acquisition expenses.

Table 9 gives an indication of how sensitive the hypothetical product is to an inaccurate forecast of interest rates. The product was originally designed to provide profit margins of 1.75 percent of assets, assuming that investment income would be 12 percent. Actual investment earnings

TABLE 8

EXPERIENCE OF FPRA ASSUMING EARNED INTEREST IN THIRD YEAR IS GREATER THAN EXPECTED

Policy Year (1)	Preprofit Fund (2)	Cash Value (3)	Expense Asset (4)	GAAP Reserve (5)	Profit (6)	Percent Profit (7)
1	$ 101.92	$ 109.44	$ 9.11	$ 100.33	$ 1.59	1.75%
2	209.13	218.27	12.40	205.87	3.27	1.75
3	320.50	330.51	14.95	315.56	4.94	1.74
4	431.80	441.49	16.43	425.06	6.74	1.75
5	546.61	554.97	16.90	538.07	8.54	1.75
6	666.13	671.99	16.27	655.72	10.41	1.75
7	791.54	793.58	14.41	779.17	12.37	1.75
8	924.10	920.84	11.19	909.65	14.44	1.75
9	1,065.09	1,054.88	6.43	1,048.45	16.65	1.75
10	1,215.91	1,196.86	0.00	1,196.86	19.05	1.75

TABLE 9

EXPERIENCE OF FPRA ASSUMING EARNED INTEREST IS GREATER THAN EXPECTED

Policy Year (1)	Preprofit Fund (2)	Cash Value (3)	Expense Asset (4)	GAAP Reserve (5)	Profit (6)	Percent Profit (7)	Expected Profit (8)
1	$ 107.38	$ 115.44	$ 9.61	$ 105.83	$ 1.55	1.71%	$ 1.59
2	226.83	237.16	13.47	223.69	3.14	1.63	3.27
3	355.71	367.28	16.62	350.67	5.04	1.67	4.96
4	496.37	508.15	18.91	489.24	7.13	1.70	6.70
5	651.62	662.35	20.17	642.17	9.45	1.71	8.49
6	824.66	832.78	20.16	812.62	12.04	1.72	10.35
7	1,019.09	1,022.71	18.57	1,004.14	14.95	1.73	12.30
8	1,239.06	1,235.83	15.02	1,220.81	18.25	1.74	14.37
9	1,489.32	1,476.34	9.00	1,467.33	21.99	1.74	16.56
10	1,775.34	1,749.01	0.00	1,749.01	26.33	1.75	18.91

of 18 percent result in profits that are somewhat smaller as a percentage of assets. As the expense asset is written down, its relative importance decreases and the percent profit tends toward that assumed in the original pricing assumption. Even though the profit is less than originally expected as a percentage of assets, the significantly higher assets mean that the dollars of profit are greater than the expected profits from the original pricing. Column 8 shows the profits originally anticipated. In the first two years, the GAAP profit is less than the expected amount, but thereafter the dollar amount is larger than the expected amount, even though the percentage is smaller. By the tenth year, the profit (in dollars) is one-third more than the expected profit on the lower interest basis.

V. OTHER CONSIDERATIONS

This paper has addressed the basic theory of GAAP reserves for the case where profit is to be recognized as a percentage of assets. In order to minimize the complexity of calculations, a number of simplifying assumptions have been made.

For example, the calculations were done on an annual basis. Premiums and expenses were recognized at the beginning of the year, and cash surrenders at the end of the year. A more realistic approach would call for calculations on a more frequent basis, such as monthly. Investment earnings and cash values probably will be based on compound interest theory. However, if profit is treated as being paid out each month (analogous to treatment used in the annual model), the profit in each month should be one-twelfth of the annual profit requirement, not the monthly compound interest equivalent. Once factors have been developed on a

monthly basis, they may be applied to the in-force by recognizing actual policy durations in years and months. Alternatively, an assumed central month of issue may be used. Either approach will avoid calendar-year versus policy-year discrepancies.

The products used for the examples are also overly simplified. In order to apply the theory to real products, additional product features must be considered. For example, many companies that market flexible annuities deduct surrender penalties if funds are withdrawn in early years. Load annuities often contain a death benefit provision that guarantees return of all premiums at death, without deduction of loads, if such return of premium exceeds the cash value. The benefit reserve for such products should be established as the present value of benefits actually expected to be paid, as opposed to using the cash value without adjustment. Such present value can be expressed most conveniently as a percentage of cash value. When the benefit reserve has been defined, the expense asset can be derived in a consistent manner, as the balancing item to produce the desired recognition of profits.

The choice of suitable assumptions, provisions for adverse deviation, and recoverability of expenses are not discussed in this paper. The considerations for these items are no different under this approach than under the more traditional GAAP profit measures for ordinary life insurance and fixed premium annuities.

VI. CONCLUSION

This paper has described a concept for redefining "revenue" on flexible premium annuity products. A methodology has been analyzed for developing GAAP reserve factors that produce profits as a level percentage of assets when actual experience matches assumptions. Key features of this methodology were investigated for two hypothetical products. The effects when experience varied from assumptions were analyzed, and the method was found to give proper recognition to such deviations from expected experience.

The method is well suited to flexible annuities. It is designed to recognize the significant investment features of this product class. This approach to GAAP reserves should be an acceptable alternative for products whose pricing strategy is based on a profit margin equal to a percentage of assets. It is also reasonable to use this approach when profit-margin objectives are expressed as a percentage of investment income.

DISCUSSION OF PRECEDING PAPER

STEVEN D. SOMMER:

Several questions occurred to me as I read Ms. Marler's paper:

1. *Do actuaries have the freedom to redefine the GAAP revenue basis?*

I certainly agree with the conclusions in the paper, that recognizing flexible premium retirement annuity (FPRA) profits in proportion to assets (or investment income) is preferable, for a number of reasons, to recognizing profits in proportion to premium income. I would go even further, in that I believe investment income should be at least one component of the GAAP revenue basis for all types of life insurance and annuity products.

We must be careful, however, in changing the definition of revenue for one type of product priced in a particular way, especially when the effect on GAAP earnings can be so large. I recalculated the GAAP profits shown in Table 4 of the paper, first releasing all profit in proportion to premium and then releasing half the profit in proportion to premium and half in proportion to invested assets. The results compare to those shown in Table 4 as shown in Table 1 of this discussion.

TABLE 1

EXPECTED GAAP PROFITS

t	(1)	(2)	(3)
1	$11.22	$ 6.39	$ 1.59
2	10.10	6.65	3.27
3	9.09	6.98	4.96
4	8.18	7.40	6.70
5	7.37	7.89	8.49
6	6.63	8.47	10.35
7	5.97	9.15	12.30
8	5.37	9.93	14.37
9	4.83	10.82	16.56
10	4.35	11.86	18.91
Present value at issue	$45.30	$45.30	$45.30

NOTE.—Col. 1: Revenue basis = premiums. Col. 2: Revenue basis = ½ premiums, ½ assets. Col. 3: Revenue basis = assets (Table 4).

In some cases it may be difficult to convince company management that the profit deferral under method 3 is appropriate, particularly when a direct application of the principles in the AICPA audit guide results in profit recognition somewhere between that of methods 1 and 2.

The accounting industry is currently investigating what the proper revenue basis should be for single premium deferred annuities, where the earnings effects of the different methods are even more severe than those shown in Table 1. Until the accountants modify their audit guide position on annuities, however, we may have trouble prescribing a method we know is more appropriate than, but technically in conflict with, the method given in the audit guide.

2. *Do we want a separate definition of revenue for each type of product?*

The author recommends, or at least presents, a method of profit recognition that could be used for FPRAs whose pricing strategy is based on a profit margin equal to a percentage of assets or to a percentage of investment income. Would it also apply to FPRAs priced by some other method? If not, then we could have two very similar products that happened to be priced in different ways, with radically different patterns of expected GAAP profits. I would think that the policy characteristics, rather than the pricing strategy, should determine the revenue basis.

Even further, I question the advisability of using one definition of revenue for life insurance plans and another completely different definition of revenue for FPRAs. Which definition do we use, then, for universal life plans, which have characteristics of both?

I believe the solution to this problem will ultimately be a composite revenue basis that is used for every type of life insurance plan. The components of this basis will be premium income, investment income, mortality gains, expense loads, and perhaps others. Different components will be relatively more important for different types of products: for term insurance plans, most of the profit will be released in proportion to mortality gains, while for annuities most will be released in proportion to investment income.

The problem here, of course, is in deciding how much of the total profit to allocate to each component of the revenue basis. This is a difficult but not an insurmountable problem; once it is solved, I believe we shall see a revision of the audit guide, containing this more general definition of revenue.

I would also like to make a comment about a calculational technique that some may find useful. Forcing profit to be released in proportion to investment income is equivalent to solving for the GAAP interest rate that causes the GAAP premium to equal the gross premium. Thus there will be no profit as a percentage of premium, and profit will be realized as the actual interest earnings exceed the GAAP assumption.

This GAAP interest rate can be determined as follows:

1. Choose all the GAAP assumptions except the GAAP interest rate.
2. Project the expected cash flows each year that result from these assumptions (premiums less expenses less policyholder benefits).
3. Solve for the discount rate that makes the present value of these cash flows zero, using the same techniques that are used in determining the yield rate for a series of cash flows. The resulting rate is the GAAP interest rate that forces the GAAP premium to equal the gross premium.

For example, in Table 4 of the paper, the cash flows equal premium income less commissions and expenses, and less the cash value paid at the end of year 10. The present value of these cash flows is zero when discounted at 10.25 percent, which is the rate the author used to calculate the GAAP reserves.

PAUL F. KOLKMAN:

The application of GAAP to deferred annuities has long been a neglected area of study. This paper is a valuable addition to the research on this topic. I was particularly happy to see the development of some fairly simple techniques that could be used by small companies or for small blocks of business where more sophisticated methods may not be justified. I also liked the discussion of some of the counterintuitive results that one can encounter in this area when actual experience differs from valuation assumptions. However, the paper's emphasis on GAAP methodology linked only to investment margins or spreads, while certainly a simple and appealing approach, raises a couple of concerns which are addressed in this discussion.

My first concern is the paper's basic premise that investment income and load are the true revenues for FPRAs. I feel that this somewhat overstates the case. While investment management is certainly a major feature of FPRAs, to define revenue as investment spread tends to emphasize this product feature to the exclusion of all others. While it is arguable that earnings for a single premium, investment-oriented product should emerge as investment spread, I feel that any product with expected future premiums should have those premiums included in the GAAP revenue stream.

For installment premium products the traditional approach of the audit guide defines revenue as premium and has two extreme applications.

1. Valuation assumptions are best estimates, and all profit is expected to emerge as a percentage of premium.
2. Valuation assumptions contain margins for adverse deviation that are so large that no profit is expected to emerge as a percentage of premium. All profit will be released as experience deviations from the conservative valuation assumptions.

In practice, GAAP valuation assumptions typically fall between the above two extremes, with some profit expected to emerge as a percentage of premium and some expected to emerge as experience deviations.

The methods developed by the paper provide a simple and convenient means of producing an expected incidence of earnings that is identical with that produced by the traditional approach at extreme 2. All earnings are expected to emerge as experience deviations in investment spreads.[1] While certainly simple and useful in certain areas, the method does lack the flexibility of the traditional method and may be unduly conservative. The level of conservatism can be seen in Table 1 of this discussion, which is based on Table 4 of the paper but shows only the "Required Profit" column. Results under four sets of assumptions are shown. Each assumption set anticipates a different percentage-of-premium component in expected earnings.

TABLE 1

REQUIRED PROFIT UNDER VARIOUS VALUATION ASSUMPTIONS

	Assumption Set			
	I	II	III	IV
Percent of premium	0%	1.50%	2.98%	4.44%
Percent of assets	1.75%	1.50%	1.25%	1.00%
Policy year:				
1	$ 1.59	$ 2.84	$ 4.08	$ 5.30
2	3.27	4.11	4.95	5.78
3	4.96	5.41	5.86	6.32
4	6.70	6.77	6.84	6.92
5	8.49	8.18	7.89	7.61
6	10.35	9.68	9.02	8.37
7	12.30	11.26	10.24	9.23
8	14.36	12.96	11.57	10.19
9	16.56	14.78	13.02	11.26
10	18.91	16.75	14.60	12.45

Expected tenth-year earnings under assumption set I are nearly 12 times the expected earnings in year 1. Such deferral of earnings may be unduly

[1] Although the method developed in the paper and the traditional approach at extreme 2 produce identical patterns of expected earnings, the two approaches are based on slightly different spread mechanics. If i is the asset earnings rate, j is the GAAP valuation interest rate, and k is the benefit accrual rate, the paper's methods produce expected earnings of $(i - j)$ times assets, under the assumptions that the spread $(j - k)$ remains constant. The traditional approach accumulates potential benefits at k and discounts at j. Thus the traditional approach produces expected earnings of $(i - j)$ times assets, under the assumption that the ratio $(1 + k)/(1 + j)$ remains constant.

conservative. The expected earnings patterns under II, III, and IV show more moderate deferral of earnings.

My second concern is the paper's emphasis on the ease of dealing with margins only and the fact that this frees one from the need to project interest rates into the distant future. This is certainly a great advantage for small blocks of business but may be dangerous for more significant blocks. The problem is that the C-3 risk may not be addressed adequately by considering only the margins on this type of business. A more sophisticated valuation would consider the maturity structure of the underlying assets and the surrender sensitivity of the business before setting valuation assumptions. For a significant block of FPRAs, various interest rate scenarios should be fully tested as part of both the pricing and the valuation process.

ALFRED RAWS III:

Ms. Marler has presented a method of calculating reserves for annuities that differs from the letter of the audit guide. The need to change is based on the substantial difference between current annuity products and those in existence when the audit guide was written. The author calculates reserves where revenue is defined to be a constant percentage of assets, rather than the more traditional premium income.

In view of the investment nature of most current annuity products, it is natural to argue that the predominant service provided to the insured relates to the investment risk, rather than any mortality risk or sales function. The general principles of the audit guide used to determine revenue then point away from premium income and toward investment income as the proper measure of revenue. This is especially pronounced for single premium annuities, where it is inappropriate to recognize all profit at issue.

In Table 4 the author displays data for a no-load policy. GAAP benefit reserves are set equal to policy cash values. Then the expense asset is taken as the excess of the cash value over the experience fund. While this might appear to be arbitrary, virtually the same result can be obtained from a traditional development of benefit and expense reserves.

It is important to note that all expenses need to be taken into account when calculating the expense asset. When premium income is considered to be revenue, then expenses which are a level percentage of premium can be ignored in the expense asset. With the revised definition of revenue, this is no longer possible.

The interest rate to be used is the net of the earned rate (12 percent) and the required profit (1.75 percent). Then calculate the ratio of the

present value of expenses to the present value of beginning-of-year assets. The net expense premium in year t is this ratio multiplied by the asset at the beginning of year t. The asset at the end of year t is given by

$$EA_t = (EA_{t-1} + \text{expenses}_t - NEP_t) \times 1.1025.$$

The net benefit premium is the gross premium less the net expense premium, and the benefit reserve is

$$B_t = (B_{t-1} + NBP_t) \times 1.1025.$$

The net premiums and reserves based on these formulas are shown in Table 1 of this discussion. While slight differences are seen when this table is compared with Table 4 of the paper, the net of the two reserves does agree with Table 4. Since it is the net of the reserves that affects income, the two approaches are equivalent.

TABLE 1

Year	Benefit Premium	Benefit Reserve	Expense Premium	Expense Asset
1	$99.31	$ 109.49	$ .69	$ 9.16
2	88.59	218.38	1.41	12.51
3	78.85	327.70	2.15	15.00
4	70.00	438.46	2.90	16.56
5	61.94	551.69	3.67	17.10
6	54.57	668.41	4.48	16.51
7	47.82	789.64	5.32	14.69
8	41.61	916.45	6.22	11.44
9	35.88	1,049.95	7.17	6.61
10	30.56	1,191.26	8.18	.02

The author uses Table 4 to calculate reserve factors for both benefits and expenses. They are arrived at by dividing the total reserve by the cash value. Then for subsequent developments (Tables 5–9), the benefit reserve and expense asset are taken to be the cash value multiplied by the factors based on Table 4.

In Tables 5–9 the author examines the pattern of profit emergence when actual experience differs from the reserve assumptions. Table 6 considers excess lapses, and Table 8 considers a higher earned rate of interest. To emphasize the results, a difference is made to exist in only one policy year. The important observation is that profit emerges as desired for all years after the difference occurs. This is the direct result of using reserve factors expressed per dollar of cash value rather than per unit. In this

manner all past differences between actual and expected get rolled up into the cash value still in force. Subsequent reserve factors can therefore ignore these past differences. So long as experience continues to match expected, the profit will remain at 1.75 percent of assets despite the presence and magnitude of past differences.

In Table 7 the author examines the impact of lower than anticipated future interest earnings. Table 7 is prepared using a constant difference between the earned and credited interest rates. The result is profit which, as a percentage of assets, increases by duration. To get an understanding of this, we must go back to the construction of Table 4.

The cash value in Table 4 is the gross premium accumulated at 9.440 percent. This credited rate is determined in the following way. Let $BOYA_t$ be the assets at the beginning of year t, i be the earned interest rate, and p be the required profit rate. Then, using data from Table 4, we have

$$BOYA_t = BOYA_{t-1}(1 + i - p) + (2)_t - (3)_t ;$$

$$\text{(Interest earned)}_t = BOYA_t \times i ;$$

$$\text{(Required profit)}_t = BOYA_t \times p ;$$

$$\text{(Experience fund)}_t = (7)_{t-1} + (2)_t - (3)_t + (5)_t - (6)_t .$$

The credited rate, j, is the solution to

$$\text{(Experience fund)}_{10} = \sum_{t=1}^{10} (2)_t(1 + j)^{11-t} .$$

The relation between i and j above can hardly be expected to be linear, much less of the form $j = i - c$. But this is the assumption on which Table 7 is based. Table 2 of this discussion corresponds to Table 7, except that in each year the credited rate, shown in column 7, is the solution to the above algorithm for the earned interest rate in that year. Now the profit as a percentage of assets is level, as desired.

Table 2 shows that, as long as the proper relation holds between actual earned and credited rates, then reserve factors based on other assumptions continue to be applicable. This is apparent when developing tradition reserve formulas for a single premium annuity.

Let

$A(t)$ = Accumulated value at time t;
$V(t)$ = Total reserve at time t;
$w(t)$ = Probability of termination subject to surrender charge at time t;

TABLE 2

Year	Premium	Commission and Expenses	Beginning-of-Year Asset	Earned Rate	Earned Interest	Credited Rate	Cash Value	Expense Asset	Profit	Profit as a Percentage of *BOYA*
1	$100.00	$9.00	$ 91.00	12.00%	$10.92	9.440%	$ 109.44	$ 9.11	$ 1.59	1.75%
2	90.00	3.60	186.73	11.75	21.94	9.191	217.77	12.37	3.27	1.75
3	81.00	3.24	283.16	11.50	32.56	8.943	325.49	14.73	4.96	1.75
4	72.90	2.92	380.74	11.25	42.83	8.694	433.03	16.12	6.66	1.75
5	65.61	2.62	479.90	11.00	52.79	8.445	540.75	16.47	8.41	1.75
6	59.05	2.36	580.97	10.75	62.45	8.196	648.96	15.71	10.17	1.75
7	53.14	2.13	684.26	10.50	71.85	7.947	757.90	13.77	11.98	1.75
8	47.83	1.91	790.05	10.25	80.98	7.698	867.76	10.54	13.81	1.75
9	43.05	1.72	898.54	10.00	89.85	7.450	978.67	5.98	15.71	1.75
10	38.74	1.55	1,009.89	9.75	98.46	7.201	1,090.67	0.00	17.67	1.75

$d(t)$ = Probability of termination not subject to surrender charge at time t (deaths, partial withdrawals);
$p(t)$ = $1 - w(t) - d(t)$;
$c(t)$ = Surrender charge at time t, expressed as a percentage of accumulated value;
$e(t)$ = Expenses at time t, expressed as a percentage of accumulated value;
$g(t)$ = Valuation interest factor for year t;
$f(t)$ = Credited interest factors for year t.

Then

$$A(t) = A(t-1)f(t)$$

and

$$V(t-1)g(t) = \{w(t)[1 - c(t)] + d(t) + e(t)\}A(t) + p(t)V(t) ,$$

so

$$\frac{V(t-1)}{A(t-1)} = \frac{f(t)}{g(t)}\left\{w(t)[1 - c(t)] + d(t) + e(t) + p(t)\frac{V(t)}{A(t)}\right\} .$$

Here the reserve factors (expressed per dollar of accumulated value) will be correct as long as $f(t)$ and $g(t)$ maintain the proper ratio, rather than the proper difference.

The author's conclusion about Table 7 is that the extra profits are caused by reduced interest charges on the unamortized policy acquisition cost. The presence of these costs certainly enters the picture. In fact, if there are no expenses and commissions, then $j = i - 0.0175$ in the development above.

In closing, we ought not to forget our friends the auditors. The AICPA has recently been considering how to account properly for single premium deferred annuities. The proposal circulated in draft form on October 26, 1982, is very similar to the author's proposal. Both have set the benefit reserve equal to the cash value. The AICPA defines revenue to be the excess of earned investment income over interest credited to the policyholders' accounts. While the AICPA proposal is not designed to be applied to the flexible premium product at hand, some comments are in order.

Profit must emerge as a level percentage of revenue and over the entire

ten-year period must have the same total as Table 4. With the AICPA definition of revenue, this necessitates an amortization table that does not utilize interest. Table 3 of this discussion displays the results of the AICPA approach. As is expected of our conservative friends, the recognition of profit is more deferred under this definition of revenue than under the author's definition. The sixth year is the first in which it exceeds the profit as set out in Table 4. Similar relationships exist between the two methods when applied to single premium deferred annuities.

PHILIP A. VELAZQUEZ:

Ms. Marler is to be congratulated on making a valuable contribution to the actuarial literature on GAAP accounting. The paper should stimulate further discussion and lead to improvements in the reporting of financial results for deferred annuity products.

Throughout the paper, the author appears to limit the discussion to flexible premium annuities. It should be pointed out that the principles discussed in the paper would work in a similar fashion for single premium deferred annuities.

In the example shown in Table 4 of the paper, the expense asset would be equal to the difference between the cash value and the experience fund. In the first year, the asset exceeds actual first-year commissions and expenses. The same result occurs in Table 9 during the first four years. As the accompanying table shows, the amortization will be negative during the first four policy years. This is unacceptable for reporting financial results under GAAP.

Policy Year	Expense Asset	Commissions and Expenses	Accumulated Commissions and Expenses
1	$ 9.61	$9.00	$ 9.00
2	13.47	3.60	12.60
3	16.62	3.24	15.84
4	18.91	2.92	18.76
5	20.17	2.62	21.38

The author correctly points out that the basic principle underlying the use of GAAP reserves is the concept that profit should be recognized in proportion to revenues. The author then sets GAAP reserves such that profits are recognized as a percentage of assets. Webster's *New Collegiate Dictionary* defines revenues to be "the gross income returned by an investment." I fail to see how revenues (or gross income) can be synonymous with assets (or investments). Even though an actuary's pricing methods may relate profit objectives to assets, this changes neither the basic

TABLE 3

Year	Premium	Earned Interest	Credited Interest	Revenue	Expenses	Net Expense Premium	Expense Asset	Reserve	Profit	Profit as a Percentage of Revenue
1	$100.00	$ 10.92	$ 9.44	$ 1.48	$9.00	$ .36	$ 8.64	$ 109.44	$ 1.12	75.68%
2	90.00	22.41	18.83	3.58	3.60	.86	11.38	218.27	2.72	75.98
3	81.00	34.04	28.25	5.79	3.24	1.40	13.22	327.52	4.39	75.82
4	72.90	45.92	37.80	8.12	2.92	1.96	14.18	438.22	6.16	75.86
5	65.61	58.19	47.56	10.63	2.62	2.57	14.23	551.39	8.06	75.82
6	59.05	70.95	57.62	13.33	2.36	3.22	13.37	668.06	10.11	75.84
7	53.14	84.35	68.06	16.26	2.13	3.93	11.57	789.29	12.33	75.83
8	47.83	98.50	79.02	19.48	1.91	4.70	8.78	916.14	14.78	75.87
9	43.05	113.56	90.55	23.01	1.72	5.56	4.94	1,049.74	17.45	75.84
10	38.74	129.66	102.75	26.91	1.55	6.49	0.00	1,191.23	20.42	75.88

definitions (assets versus revenues) nor the basic principle (recognition of profits in proportion to revenues). Therefore, the methods presented in Ms. Marler's paper are inconsistent with the principles of the AICPA's *Audit Guide for Stock Life Insurance Companies.*

A method that is gaining increasing support from both the actuarial and the accounting profession is to define the revenues for flexible premium products, such as annuities, to include *excess* investment income and sales loads. A predetermined percentage of revenues will be used to amortize expenses. This percentage will be set so that the present value of commissions and expenses would be equal to the present value of "expense net premiums." A relatively short amortization period of seven to ten years is recommended. Also, the discount rate should be selected so that the amortization percentage is relatively high. Any withdrawal charges would be classified as negative expenses and thus would completely reduce the expense asset. The ratios of expense asset to cash values, on a year-of-issue basis, would be tracked, and if large deviations from expected occur, appropriate adjustments would be required. Presumably, under the current lock-in principle, adjustments would be allowable only if the ratio becomes too large, which would indicate insufficient revenues to amortize actual expenses.

ALAN DUBIN:

Ms. Marler has clearly presented an alternative accounting philosophy and reserving methodology for flexible and single premium annuities. I will direct my comments to two areas: (1) the observation that almost identical profit recognition can be achieved without redefinition of revenue and (2) a description of the expense amortization for the no-load annuity.

Definition of Revenue

The goal of recognizing profit only when excess interest is earned can be achieved without a redefinition of revenue. Premium remains the basis of revenue; however, the GAAP interest assumption is that only the interest required for cash-value increases will be earned. In other words, the GAAP interest rate is equal to the break-even interest rate. For flexible premium annuities, an additional assumption is made that no premium is expected in future years. (No-load annuity requirements are discussed below.) Using these interest and premium assumptions, reserves and profits will emerge as excess interest income is earned.

For a single premium deferred annuity, if revenue is defined as interest earnings, a true expense asset is established at issue, since an expense has been recognized without recognition of revenue. However, if premium

is the measure of revenue, there will be no expense asset, since all premium has been recognized. The net reserve, the benefit reserve less the expense asset, using the two methods is identical.

If a company, within the bounds of GAAP conservation, could expect to earn the interest spread into the future, I do not believe there would be the current hesitancy about "up-fronting" profits at issue. However, in today's competitive marketplace companies face greater uncertainty in their ability to earn a predetermined interest spread. Therefore, the break-even GAAP interest assumption is most reasonable. If the interest spread can be reasonably expected into the future, the up-fronting of the profit associated with that spread is an acceptable approach.

No Load Annuity Expense Amortization

For a no-load annuity, the issuing company amortizes the acquisition expense through interest earnings above those required for increases in the cash value of the contract. Therefore, the break-even interest rate is not the rate credited to the cash value. Instead, it equals the sum of the rate credited to the cash value and the interest margin required to amortize acquisition expenses. Therefore, reserves computed to recognize profit as excess interest is earned are computed at a higher interest rate that includes a margin for amortization of acquisition expenses.

An example is a single premium deferred no-load annuity where the initial acquisition expense is L percent of the single premium. There are no assumed surrenders or withdrawals for the first ten policy years. Reserves are computed to amortize the acquisition expenses over ten years. The interest rate required for acquisition expense amortization, i_A, is developed through the following equation:

$$(SP)(1 - L\%)(1 + i_A)^{10} \prod_{t=1}^{10} (1 + i_t) = (SP) \prod_{t=1}^{10} (1 + i_t) ,$$

or

$$i_A = 1/(1 - L\%)^{1/10} - 1 ,$$

where SP is the single premium and i_t is the rate actually credited in year t to the contract. Therefore, if $L = 5$ percent, $i_A = 0.5142$ percent.

The reserve at duration x equals

$$(1 - L\%)^{(10-x)/10} SP \prod_{t=1}^{x} (1 + i_t) ,$$

or

$$(SP \prod_{t=1}^{x} (1 + i_t)(1 + i_A)^x .$$

If revenue is defined as interest earnings, the net reserve is split into a benefit reserve piece and an expense asset piece by setting the benefit reserve equal to the accumulated single premium and leaving the expense asset as a balancing item. Alternatively, as shown below, the expense asset can be developed independently.

The development of the expense asset in the following example demonstrates the role of i_A, the required interest for acquisition expense amortization.

Assume the following:

1. Single premium	$1,000
2. First-year credited interest	10%
3. Initial acquisition expense	5%
4. i_A	0.5142%
5. Benefit reserve at issue	$1,000
6. Expense asset at issue	$50
7. Net reserve [(5) − (6)]	$950
8. Benefit reserve on first anniversary	$1,100.00
9. Expense asset on first anniversary	$49.63
10. Net reserve [(8) − (9)]	$1,050.37

The net reserve can be looked at at the initial reserve of $950 accumulated at credited interest i, plus the additional rate of i_A. In our example $1,050.37 = ($950)(1.1)(1.005142).

Alternatively, the expense asset of $50 is accumulated at the sum of the credited interest rate i, plus the additional rate of i_A. The expense premium is equal to i_A multiplied by the benefit reserve at the end of the year. The expense asset at the end of the first year is developed as follows:

(Expense asset at issue) × (Credited interest rate) × $(1 + i_A)$

$$- (i_A) \times \text{(Year-end benefit reserve)} = \text{Expense asset} ,$$

or

$$(\$50)(1.10)(1.005142) - (0.005142)(\$1,100) = \$49.63 .$$

(AUTHOR'S REVIEW OF DISCUSSION)

CAROL A. MARLER:

I want to thank all those who took time to comment on my paper. In addition to the written discussions, several people gave comments on a more informal basis. The area of proper accounting for annuities under generally accepted accounting principles is generating much current attention. I believe that the actuarial profession should be in a position to give its expert advice to the accounting profession in this area. The original draft of this paper had exactly that purpose in mind. In light of the discussions and subsequent experience in selecting a suitable method for annuity reserves in my own company, I have some additional remarks on two aspects of GAAP for annuities.

First, I am impressed by the power of the "release from risk" approach to reserves and recognition of profit. Profits can be produced either in proportion to assets or in proportion to interest income by suitable choice of the formula for the interest delta. Several of the discussants have pointed out the equivalence of my approach to one in which the interest delta is selected to produce zero profits at issue. In a similar manner, a suitable choice of assumptions could produce profit as a percentage of load, or perhaps even as a percentage of "back-end" surrender charges. To the extent that it is possible to do this, much of the activity by the accounting profession toward redefining revenues becomes redundant. The task of allocating profit to the various elements of risk comes back to the actuary, by his selection of actuarial best estimates and the choice of proper margins.

This leads into the second aspect that I wanted to discuss, namely, the allocation of each element of income into its components of benefit, expense, risk charges, and profit.

Mr. Sommer and Mr. Kolkman discuss the emergence of profit under varying allocatins between premium and investment components. At Beneficial Standard Life, for our periodic premium business, the decision was to use a basis that related half of profits to premium and half to assets. On single premium business (a relatively smaller portion of our in-force) all profit was allocated so as to emerge as a percentage of assets.

Both Mr. Raws and Mr. Velazquez address the issue of charging interest on the expense portion of the reserve. It is this interest charge that can cause the expense asset to exceed total past expenses in the early years. Both conclude that such interest calculations may be unacceptable to the accountants. I feel that recognition of interest is not only appropriate but necessary.

The expense asset represents funds borrowed by the annuity product

class in order to generate new business. These funds ought to be repaid at a suitable rate; the expense asset does this. It is well accepted that a company that owns its own building charges rent to the various departments and recognizes this rent as part of its investment income. When interest is charged on the expense asset and added to the investment income before deduction of the policyholder share, the "excess investment income" revenue as defined by the AICPA method is consistent with that inherent in Table 4.

Mr. Dubin gives a formulation for DPAC on single premium contracts that includes interest thereon. I find it interesting to compare his approach with the traditional "present-value" reserves. His net reserve, benefit less DPAC, is equal at each duration to the present value of benefits. If he had recognized some maintenance expenses in future years, his net reserve would be present value of benefits and expenses. Using present-value logic only would produce a benefit reserve and an expense reserve. However, what we actually get instead is a redundant reserve for benefits and an offsetting expense asset. This situation is exaggerated for the single premium product, but also exists for the periodic plan. Comparing Table 4 with the calculation made by Mr. Raws on a present-value approach shows good agreement as to net reserves, but the allocation into benefit and expense portions is different.

In the absence of consensus on benefit versus expense, it seems unlikely that a single answer exists for the proper level of the risk premium. In particular, the C-3 risk for flexible and single premium annuity products can be substantial. It is begging the question to select an interest delta to product a particular pattern of profits and then to conclude that the risks relating to assets have been properly provided for.