TRANSACTIONS OF SOCIETY OF ACTUARIES
1973 VOL. 25 PT. 1 NO. 73

GAAP IN PRACTICE

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ABSTRACT

Generally accepted accounting principles are now to be applied to the earnings of stock life insurance companies. This paper has been prepared in order to set down some of the approaches which might be followed in carrying out this mandate. It is not intended as a definitive treatment of the subject but rather has as its raison d'être the acquainting of the reader with a number of approaches which have proved successful.

The topics discussed in the paper are (1) the basic approach, (2) formulas, (3) an illustrative example, (4) grading into statutory reserves, (5) varying the assumptions, (6) participating insurance, (7) health insurance, (8) other coverages, (9) treatment of reinsurance, (10) other problems and questions, and (11) conclusion.

The appropriateness of the various assumptions and their inherent provision for adverse deviation, the question of which first-year expenses should be capitalized, and the complex matter of providing for deferred income taxes are not discussed here.

BASIC APPROACH

THE approach that a company will follow in converting to a generally accepted accounting principles (GAAP) basis will depend on the availability of the basic information (premiums, expenses, death benefits, cash values, dividends, and so on); computer capacity; manpower; and the volume, distribution, and complexity of the in-force business.

Certainly an old, established company that has been selling ordinary, industrial, and health insurance for many years will have problems far different from those of a ten-year-old company selling only individual life policies. The decision to produce benefit and expense factors (comparable to statutory factors) for every plan, issue age, and duration will dictate an approach different from that indicated if decennial age factors are calculated for a model office. The possible necessity for voluminous keypunching may call for still another method.

In working with many small companies, we have found that generally the only data available on cards or tape are statutory mean reserves. Thus our usual approach has been as follows:

1. A model is created which will cover perhaps 80–85 per cent of the in-force business based on premium, face amount, and reserve. A criterion based on reserves alone is not sufficient. Term plans may have relatively insignificant statutory reserves, but generally they cannot be overlooked in the GAAP process.

2. Benefit and expense reserve factors are calculated for decennial or quinquennial issue ages for the model plans.

3. The plans outside the model are assigned to the most similar model plan. If no appropriate model plan is available, then, depending on the nature and materiality of the plan, either benefit and expense reserve factors are calculated specially or statutory reserves are used.

4. The GAAP factors are applied to the age-grouped in-force business of the model plans and to the plans assigned to a model plan.

5. Central-age statutory reserve factors also are applied to the grouped in-force business of the model plans, along with their nonmodel assigned plans. The result is compared with the normal statutory reserve calculation at year end for all ages and plans. This ratio or adjustment is then applied to the GAAP benefit and expense reserves of the model and assigned plans. This procedure adjusts for any inherent bias arising from the use of decennial or quinquennial age factors rather than individual ages and the use of key plans rather than all plans. If the deviation is substantial, an investigation should be made to determine the reasons. This process can be expressed by formula as follows:

$$A_{GR} = M_{GR}\left(\frac{A_{SR}}{M_{SR}}\right),$$

where

A_{SR} = Actual statutory reserve;
M_{SR} = Statutory reserve produced by the model;
M_{GR} = GAAP reserve produced by the model;
A_{GR} = Final GAAP reserve, adjusted for any inherent age bias and for the use of model plans rather than all plans.

It is useful to rearrange the terms of the equation as follows:

$$A_{GR} = A_{SR}\left(\frac{M_{GR}}{M_{SR}}\right).$$

The ratio M_{GR}/M_{SR} may be a projectable item—either using the total M_{GR} or breaking it down into its benefit and expense components. A_{GR} can then be derived from a projection of A_{SR}. Most companies are already forecasting the latter item. This approach also could be used to estimate GAAP reserves for quarterly statements.

6. Acquisition expenses inherent in the expense factors are then compared with actual deferrable acquisition expenses to ensure that we are not capitalizing more moneys than are actually being spent.

7. A check is made to determine that capitalized expenses are recoverable. Otherwise, deficiency reserves must be set up or a lesser amount capitalized. A comparable problem can arise because of heavy renewal expenses.

The whole purpose is to so mechanize or standardize the process that it can become a routine matter somewhat comparable to the calculation of statutory reserves.

As mentioned above, each year we must test to ensure that we do not capitalize more moneys than are actually spent. This might dictate factors somewhat lower than called for, since no one wants to change factors each year. An alternative approach would be to develop a specific multiplier for the results of each year of issue. This multiplier, when applied to the first-year expenses implicit in the expense reserve factor, would produce the actual new-business expenses for the given year of issue. This would require the tabulation of expense reserves by year of issue.

In designing a computer program, it may be advantageous to provide for two types of first-year expenses—capitalizable and noncapitalizable. Only the first type of expenses can be deferred. However, using both the first and the second type of expenses enables us to determine the profitability of the plan.

Many companies desire to calculate reserve factors for each specific plan–issue age combination without becoming involved in the massive calculation job that might result. Possible shortcuts include the following:

1. Comparing benefit and statutory reserves at decennial issue ages. Interpolate this ratio for other issue ages. The application of this interpolated ratio to statutory reserves produces benefit reserves at the intervening issue ages.
2. Instead of keypunching or calculating cash values, applying ratios to mean reserves to estimate the cash values.

FORMULAS

The next step in computing benefit and expense reserves is setting down the appropriate mathematics and deciding on how many variables to provide for in the calculation.

The formulas used to generate the calculations set forth in this paper are as follows for an n-payment plan with level gross premiums, providing benefits for at least m years:

Expense premium:

$$ {}^{E}NP_x = \frac{\sum_{t=1}^{m} {}_tE_x D_{[x]+t-1}}{\sum_{t=1}^{n} D_{[x]+t-1}}. $$

Benefit premium:

$$ {}^{B}NP_x = \frac{D_{[x]+m}\ {}_mTV_x + \sum_{t=1}^{m} ({}_tI_xC_{[x]+t-1} + {}_tCV_xW_{[x]+t-1} + {}_tD_xL_{[x]+t-1})}{\sum_{t=1}^{n} D_{[x]+t-1}}. $$

Expense terminal reserve:

$$ {}_dV_x^E = \frac{\sum_{t=d+1}^{m} {}_tE_x D_{[x]+t-1}}{D_{[x]+d}} - \frac{{}^{E}NP_x \sum_{t=d+1}^{n} D_{[x]+t-1}}{D_{[x]+d}}. $$

Benefit terminal reserve:

$$ {}_dV_x^B = \frac{D_{[x]+m}\ {}_mTV_x + \sum_{t=d+1}^{m} ({}_tI_xC_{[x]+t-1} + {}_tCV_xW_{[x]+t-1} + {}_tD_xL_{[x]+t-1})}{D_{[x]+d}} - \frac{{}^{B}NP_x \sum_{t=d+1}^{n} D_{[x]+t-1}}{D_{[x]+d}}. $$

The various items are defined as follows:

x = Issue age;
m = Duration at which benefit reserve grades into statutory terminal reserve and at which expenses are fully amortized;
n = Premium-paying period, $n \leq m$;
$q_{[x]+t-1}$ = Mortality rate during tth policy year;
$w_{[x]+t-1}$ = Withdrawal rate at end of policy year t;
${}_tCV_x$ = Cash value at end of policy year t;
${}_tD_x$ = Dividend and/or pure endowment payable at end of policy year t;
${}_tE_x$ = Expense incurred at beginning of policy year t;
${}_tI_x$ = Average death benefit during policy year t;
${}_mTV_x$ = Statutory terminal reserve at end of policy year m;

$$
\begin{aligned}
l_{[x]+t-1} &= l_{[x]+t-2}(1 - q_{[x]+t-2})\ (1 - w_{[x]+t-2});\\
D_{[x]+t-1} &= v^{t-1} l_{[x]+t-1};\\
C_{[x]+t-1} &= \tfrac{1}{2}(v^{t-1} + v^{t})\ (q_{[x]+t-1})\ (l_{[x]+t-1});\\
L_{[x]+t-1} &= v^{t} l_{[x]+t-1}(1 - q_{[x]+t-1});\\
W_{[x]+t-1} &= L_{[x]+t-1}\, w_{[x]+t-1}.
\end{aligned}
$$

Thus the implicit assumptions are that (1) premiums are collected annually, (2) deaths take place half at the beginning of the year and half at the end of the year, (3) lapses take place at year end and provide the policy-year cash value, (4) expenses occur at the beginning of the policy year, and (5) dividends are payable at the end of the policy year.

In calculating calendar-year reserve factors, one of a number of methods can be employed. One possibility is the standard approach used in the calculation of statutory mean reserve factors. With the introduction of termination rates and expenses into the reserve calculation, this method may no longer be the best possible approach. A better one would be to compute an "initial" reserve and bring it forward for a half-year with interest and survivorship. Thus the formulas are as follows:

Expense reserve:

$$
{}_{t}IV_{x}^{E} = \frac{({}_{t-1}V_{x}^{E} + {}^{E}NP_{x} - {}_{t}E_{x})(1 + i)^{1/2}}{1 - \tfrac{1}{2}q_{[x]+t-1}}.
$$

Benefit reserve:

$$
{}_{t}IV_{x}^{B} = \frac{({}_{t-1}V_{x}^{B} + {}^{B}NP_{x} - \tfrac{1}{2}q_{[x]+t-1}\ {}_{t}I_{x})(1 + i)^{1/2}}{1 - \tfrac{1}{2}q_{[x]+t-1}}.
$$

An alternative approach would be to start with a "terminal" reserve and discount back for a half-year's interest and survivorship.

ILLUSTRATIVE EXAMPLE

Using the formulas set forth in the previous section, we computed net premiums and reserves for a whole life plan, issue age 35, with minimal cash values and with the following assumptions:

1. Mortality: 1955–60 Basic Select and Ultimate Mortality Table—Males.
2. Withdrawals: Linton B table.
3. Interest: 5 per cent.
4. Benefit reserve grades into the statutory reserve at the end of thirty years, and expenses are fully amortized by that time.
5. Gross premium: $17.90 per $1,000 plus a $12.00 policy fee.
6. Average size: $12,000.
7. Commissions:

Year 1	90%
Years 2–10	7½
Years 11–30	3

8. Taxes: 3 per cent of premium.
9. Expenses: Per $1,000: $10.00 first year, $0.50 renewal years; per policy: $66.00 first year, $11.00 renewal years.

The resulting net expense premium was $7.26, and the net benefit premium was $10.49. Terminal and calendar-year reserves for key durations are shown in Table 1.

TABLE 1

TERMINAL AND CALENDAR-YEAR RESERVES FOR KEY DURATIONS

Year	Cash Value	Terminal Reserve			Calendar-Year Reserve		
		Expense	Benefit	Total	Expense	Benefit	Total
1	$ 0	−$33.92	$ 12.79	−$ 21.13	−$26	$ 10	−$ 16
2	0	− 35.90	26.68	− 9.22	− 31	23	− 8
3	14	− 37.44	40.46	3.02	− 33	37	4
5	46	− 39.86	68.26	28.40	− 36	66	30
10	130	− 42.93	141.28	98.35	− 40	139	99
15	220	− 38.42	221.04	182.62	− 36	218	182
20	314	− 30.82	307.45	276.63	− 29	304	275
25	409	− 19.13	403.43	384.30	− 18	399	381
30	501	0	510.00	510.00	0	504	504

GRADING INTO STATUTORY RESERVES

Should calculations be made for the life of the policy, or are we reasonably accurate if we grade into the statutory reserve at the end of a specific year?

Grading is obviously simpler if premiums, death benefits, cash values, and/or dividends must be keypunched. Assuming Linton B persistency, and the 1955–60 Basic Select and Ultimate Table—Male Lives, approximately 23, 13, 6, and 2 per cent of the business remains in force at the end of the twentieth, thirtieth, fortieth, and fiftieth policy years at issue age 35. Aside from its practicality, grading may sometimes be justified on the grounds that the reserve factors are not set for all time and quite likely will be changed before the differential between graded reserves and lifetime reserves becomes too great.

Grading really does not mean that we are assuming 1958 CSO mortality and 3½ per cent interest after, say, the thirtieth year. It only means that we are using statutory reserve factors after this initial period. A review of Table 2 shows that it does make a significant difference (par-

TABLE 2

EFFECT OF GRADING INTO STATUTORY RESERVE AT CERTAIN DURATIONS

(Whole Life—Age 35)

	Grading into Statutory Reserve in Year				
	20	30	40	50	50 Modified
	Net Premium				
Expense	$ 7.66	$ 7.26	$ 7.14	$ 7.11	$ 6.97
Benefit	10.71	10.49	10.33	10.28	10.80
Total	$ 18.37	$ 17.75	$ 17.47	$ 17.39	$ 17.77
	Benefit Reserve				
Policy year:					
1	$ 13.07	$ 12.79	$ 12.58	$ 12.52	$ 13.19
2	27.28	26.68	26.24	26.11	27.53
3	41.43	40.46	39.77	39.56	41.83
4	55.63	54.27	53.29	52.99	56.20
5	70.07	68.26	66.95	66.56	70.83
10	146.01	141.28	137.88	136.84	147.97
20	324.00	307.45	295.54	291.92	330.89
30	510.00	510.00	472.14	460.63	581.16
40	672.00	672.00	672.00	627.66	717.87
50	800.00	800.00	800.00	800.00	800.00
	Expense Asset				
Policy year:					
1	$ 33.38	$ 33.92	$ 34.07	$ 34.10	$ 34.29
2	34.77	35.90	36.23	36.30	36.70
3	35.64	37.44	37.95	38.06	38.70
4	36.18	38.72	39.44	39.60	40.51
5	36.48	39.86	40.82	41.03	42.22
10	34.13	42.93	45.44	45.99	49.11
20	0	30.82	39.59	41.53	52.45
30	0	0	27.88	34.06	66.02
40	0	0	0	23.82	39.58
50	0	0	0	0	0
	Total Reserve (Benefit Reserve less Expense Asset)				
Policy year:					
1	−$ 20.31	−$ 21.13	−$ 21.49	−$ 21.58	−$ 21.10
2	− 7.49	− 9.22	− 9.99	− 10.19	− 9.17
3	5.79	3.02	1.82	1.50	3.13
4	19.45	15.55	13.85	13.39	15.69
5	33.59	28.40	26.13	25.53	28.61
10	111.88	98.35	92.44	90.85	98.86
20	324.00	276.63	255.95	250.39	278.44
30	510.00	510.00	444.26	426.57	515.14
40	672.00	672.00	672.00	603.84	678.29
50	800.00	800.00	800.00	800.00	800.00

ticularly for long-term permanent plans) at what point benefit reserves merge into statutory reserves. And, very importantly, merging at a specific point means that acquisition expenses are amortized over a shorter period.

In calculating net premiums and reserves for Table 2, the assumptions set forth in the preceding section were used. In the fiftieth-year modified case the same assumptions were used for the first thirty years. Thereafter, statutory assumptions were used, that is, no expenses and no lapses, 1958 CSO mortality, and 3 per cent interest.

Initially the reserves vary little according to the grading period. With time, as expected, the effect becomes quite substantial, the difference being far greater between twenty- and thirty-year grading than between forty- and fifty-year grading.

Thus we see that grading into statutory reserves at a certain duration produces an inherent conservatism all its own. For example, the use of thirty-year grading with a $5\frac{1}{2}$ per cent interest assumption may produce greater over-all reserves than reserves computed for lifetime with a 5 per cent interest assumption.

VARYING THE ASSUMPTIONS

One learns early in this exercise to shy away from predicting the effect of varying the assumptions. GAAP is a new situation, and it will probably require time for actuaries to develop a real "feel" for the results. In this section we will show some effects of varying the interest, lapse, and mortality assumptions for a specific plan at a specific issue age. In all cases the benefit reserve grades into the statutory reserve at the end of the thirtieth year, and, concomitantly, the expense asset is fully amortized at that time. Only terminal reserve factors are shown.

Interest

Table 3 shows the results of varying the interest assumption. As expected, a level 4 per cent interest rate generates higher benefit reserve factors than a level 5 per cent rate, which in turn yields greater reserve factors than a level 6 per cent rate. The change in interest rate had a minimal effect on the expense asset.

We know why higher-level interest rates bring lower benefit reserves. With regard to expense reserves, the reasons are somewhat more obscure. A higher interest rate means that the expense asset is amortized more slowly, since the interest increment assumes more importance. If an interest rate of zero is assumed, then in effect we have one variation of the accountants' worksheet approach.

TABLE 3

EFFECT OF VARYING THE INTEREST ASSUMPTION

(Whole Life—Age 35)

	1	2	3	4	5
	Interest Rate				
Policy years:					
1–5	4%	5%	6%	6%	7.5%
6–10	4	5	6	6	7.0
11–15	4	5	6	5	6.5
16–20	4	5	6	5	6.0
21–25	4	5	6	5	5.5
26–30	4	5	6	5	5.0
	Net Premium				
Expense	$ 6.95	$ 7.26	$ 7.56	$ 7.48	$ 7.87
Benefit	11.66	10.49	9.47	10.12	9.14
Total	$ 18.61	$ 17.75	$ 17.03	$ 17.60	$ 17.01
	Benefit Reserve				
Policy year:					
1	$ 14.19	$ 12.79	$ 11.57	$ 12.43	$ 11.29
2	29.46	26.68	24.24	26.07	23.85
5	75.17	68.26	62.15	67.68	62.69
10	154.08	141.28	129.70	144.60	134.79
15	237.47	221.04	205.78	224.01	217.78
20	324.41	307.45	291.24	309.84	309.46
25	416.10	403.43	390.88	404.91	408.90
30	510.00	510.00	510.00	510.00	510.00
	Expense Asset				
Policy year:					
1	$ 33.99	$ 33.92	$ 33.84	$ 33.95	$ 33.90
2	36.01	35.90	35.79	36.02	36.00
5	39.95	39.86	39.73	40.42	40.70
10	42.73	42.93	43.06	44.94	45.20
15	37.78	38.42	38.96	40.22	41.77
20	29.85	30.82	31.69	32.26	34.33
25	18.20	19.13	20.02	20.02	21.61
30	0	0	0	0	0
	Total Reserve (Benefit Reserve less Expense Asset)				
Policy year:					
1	−$ 19.80	−$ 21.13	−$ 22.27	−$ 21.52	−$ 22.61
2	− 6.55	− 9.22	− 11.55	− 9.95	− 12.15
5	35.22	28.40	22.42	27.26	21.99
10	111.35	98.35	86.64	99.66	89.59
15	199.69	182.62	166.82	183.79	176.01
20	294.56	276.63	259.55	277.58	275.13
25	397.90	384.30	370.86	384.89	387.29
30	510.00	510.00	510.00	510.00	510.00

Column 4 of Table 3 shows factors based on 6 per cent for ten years and 5 per cent thereafter. Under column 5 the rate is $7\frac{1}{2}$ per cent for the first five years, then decreases by $\frac{1}{2}$ per cent every five years to an ultimate level of 5 per cent. Comparing these results with the level 5 per cent data, we see that the graded bases produce lower benefit reserves at the outset. Eventually the graded reserves become higher. The maximum differential occurs at the point where the ultimate interest rate is reached. This corresponds with what we know happens with variable interest statutory reserves.

As we see, it is not immediately apparent whether the choice of a particular variable interest rate is conservative or liberal. Without grading into statutory, the effect on reserves of varying the interest rate becomes even greater. With respect to the expense asset, the graded interest bases generally produce a greater asset. This is to be expected.

Lapses

Table 4 shows, at key durations, the results of using Linton A, B, C, and D lapse tables. Both the benefit reserve and expense asset increase as the termination rate increases. In this example the changes from one basis to another tend to be offsetting.

On the basis of the expense assumptions used herein, the increase in the expense asset exceeds the increase in the benefit reserve. Presumably, if lower acquisition expense assumptions were used, the differential would be smaller or might even shift so that the increase in benefit reserve would exceed the increase in expense asset as the lapse rate increased.

A high lapse rate means that there are fewer policies remaining with which to amortize the capitalized asset. In effect, then, the capitalized asset per $1,000 will rise further and faster before it starts its precipitous descent.

Mortality

Table 5 shows the benefit and expense reserve factors produced by various mortality assumptions for one plan-issue age combination. There is little divergence in the benefit reserves based on the following tables, all of which have the same ultimate mortality rate.

A: 1955–60 Basic Select and Ultimate—Males
B: 1958 CSO
E: 1955–60 Basic Ultimate—Males
F: 1960 Basic Group

TABLE 4

EFFECT OF VARYING THE LAPSE ASSUMPTION

(Whole Life—Age 35)

	Lapse Rate			
	Linton A	Linton B	Linton C	Linton D
	Net Premium			
Expense	$ 5.92	$ 7.26	$ 8.96	$ 11.08
Benefit	11.05	10.49	9.68	8.65
Total	$ 16.97	$ 17.75	$ 18.64	$ 19.73
	Benefit Reserve			
Policy year:				
1	$ 12.02	$ 12.79	$ 13.40	$ 13.83
2	24.75	26.68	28.39	29.80
5	63.92	68.26	72.49	76.37
10	135.34	141.28	147.54	153.75
15	215.26	221.04	227.49	234.23
20	302.99	307.45	312.81	318.73
25	401.16	403.43	406.49	410.21
30	510.00	510.00	510.00	510.00
	Expense Asset			
Policy year:				
1	$ 31.71	$ 33.92	$ 36.20	$ 38.53
2	32.64	35.90	39.26	42.67
5	34.38	39.86	45.64	51.60
10	35.56	42.93	51.03	59.69
15	30.70	38.42	47.15	56.70
20	23.82	30.82	38.97	48.15
25	14.21	19.13	25.13	32.19
30	0	0	0	0
	Total Reserve (Benefit Reserve less Expense Asset)			
Policy year:				
1	−$ 19.69	−$ 21.13	−$ 22.80	−$ 24.70
2	− 7.89	− 9.22	− 10.87	− 12.87
5	29.54	28.40	26.85	24.77
10	99.78	98.35	96.51	94.06
15	184.56	182.62	180.34	177.53
20	279.17	276.63	273.84	270.58
25	386.95	384.30	381.36	378.02
30	510.00	510.00	510.00	510.00

TABLE 5

EFFECT OF VARYING THE MORTALITY ASSUMPTION

(Whole Life—Age 35)

	Basis; Mortality Table						
	A 1955–60 Basic Select and Ultimate Males	B 1958 CSO	C 150% of 1955–60 Basic Select and Ultimate Males	D 200% of 1955–60 Basic Select and Ultimate Males	E 1955–60 Basic Ultimate Males	F 1960 Basic Group	G 1955–60 Basic Select and Ultimate Females
	Net Premium						
Expense	$ 7.26	$ 7.31	$ 7.31	$ 7.35	$ 7.27	$ 7.28	$ 7.22
Benefit	10.49	11.98	11.81	13.09	10.81	11.05	9.38
Total	$ 17.75	$ 19.29	$ 19.12	$ 20.44	$ 18.08	$ 18.33	$ 16.60
	Benefit Reserve						
Policy year:							
1	$ 12.79	$ 12.54	$ 14.04	$ 15.23	$ 12.41	$ 12.55	$ 11.68
2	26.68	26.26	29.21	31.62	26.00	26.24	24.34
5	68.26	67.62	74.90	81.21	67.17	67.44	61.44
10	141.28	139.83	155.14	168.25	139.81	139.31	125.34
15	221.04	219.36	240.63	259.16	218.43	218.15	198.53
20	307.45	307.10	328.87	349.24	305.36	305.16	282.36
25	403.43	403.40	420.71	437.50	402.13	400.85	382.98
30	510.00	510.00	510.00	510.00	510.00	510.00	510.00
	Expense Asset						
Policy year:							
1	$ 33.92	$ 33.90	$ 33.86	$ 33.81	$ 33.92	$ 33.92	$ 33.96
2	35.90	35.88	35.80	35.70	35.92	35.90	35.99
5	39.86	39.82	39.59	39.33	39.88	39.86	40.11
10	42.93	42.94	42.42	41.93	42.97	42.98	43.49
15	38.42	38.50	37.81	37.22	38.51	38.52	39.10
20	30.82	30.91	30.34	29.88	30.89	30.90	31.37
25	19.13	19.26	18.99	18.85	19.18	19.21	19.33
30	0	0	0	0	0	0	0
	Total Reserve (Benefit Reserve less Expense Asset)						
Policy year:							
1	−$ 21.13	−$ 21.36	−$ 19.82	−$ 18.58	−$ 21.51	−$ 21.37	−$ 22.28
2	− 9.22	− 9.62	− 6.59	− 4.08	− 9.92	− 9.66	− 11.65
5	28.40	27.80	35.31	41.88	27.29	27.58	21.33
10	98.35	96.89	112.72	126.32	96.84	96.33	81.85
15	182.62	180.86	202.82	221.94	179.92	179.63	159.43
20	276.63	276.19	298.53	319.36	274.47	274.26	250.99
25	384.30	384.14	401.72	418.65	382.95	381.64	363.65
30	510.00	510.00	510.00	510.00	510.00	510.00	510.00

TABLE 5—*Continued*

	Basis; Mortality Table						
	A 1955–60 Basic Select and Ultimate Males	B 1958 CSO	C 150% of 1955–60 Basic Select and Ultimate Males	D 200% of 1955–60 Basic Select and Ultimate Males	E 1955–60 Basic Ultimate Males	F 1960 Basic Group	G 1955–60 Basic Select and Ultimate Females
	Mortality Rate						
Policy year:							
1.....	0.77	2.51	1.15	1.54	1.40	1.54	0.49
2.....	0.96	2.64	1.44	1.92	1.49	1.68	0.69
5.....	1.58	3.25	2.37	3.16	1.91	2.27	1.21
10.....	3.15	4.92	4.72	6.30	3.45	3.87	2.12
20.....	10.09	11.90	15.14	20.18	10.09	10.51	5.23
30.....	25.83	29.04	38.74	51.66	25.83	25.26	11.81

On the other hand, assuming a constant multiple of the 1955–60 Basic Select and Ultimate Mortality Table—Males results in substantially different benefit factors. Basis C (150 per cent mortality) and Basis D (200 per cent mortality) assumptions result in significantly higher benefit factors than Basis A (100 per cent mortality). These tables have a much steeper slope, and this is the crucial element. The divergence would be greater if, in the example, we did not grade into the thirtieth-year statutory reserve. Apparently, extreme caution should be exercised before adopting the constant-multiple approach. Is it truly representative of actual or expected experience?

Basis G (1955–60 Basic Select and Ultimate—Females) benefit reserve results are significantly lower than the corresponding results for Basis A (Males). Thus consideration should be given to varying the mortality assumption for any plan or block of business which includes a large proportion of female lives.

At age 35 varying the mortality assumption had little effect on the expense asset. As the q's become larger, their effect on the amortization of expenses will become more pronounced.

PARTICIPATING INSURANCE

Dividends can be treated as a pure endowment benefit. The problem thereby becomes more manageable. What should we do when the divi-

dend scale is changed? Since many companies do change their dividend scales every few years, this can be a vexing problem—particularly where companies have many blocks of participating business with varying dividend scales. One way of approaching this problem is to assume that the dividend scale was "locked in" at issue. Thus changes in subsequent dividends are presumably offset by changes in the then current experience. This is readily apparent from observation of the increase in dividends caused by, say, a ½ per cent increase in interest earnings. The additional dividend paid each year theoretically is offset completely by additional investment earnings.

What additional adjustments are called for when there is a statutory or corporate limitation on the earnings that stockholders can derive from participating business? Typically, this is 50 cents per $1,000 of insurance, or 10 per cent of statutory earnings before dividends, or the greater of these two limitations.

One approach is to calculate benefit and expense reserves without dividends, and then to transfer the appropriate amount to the stockholders' account. All remaining earnings would be set up as a policyholder liability. Where the domicile state has no limitation, but other states do, separate treatment by state may be required.

Must the dividend and benefit interest rates be identical? Is there anything inherently wrong in dividends being based on 5½ per cent for all years while benefit reserves are based on 6 per cent grading down to 4½ per cent? We think not.

HEALTH INSURANCE

Calculating GAAP reserves for health insurance is in many ways a more complicated matter than for life policies. This is true for the following reasons:

a) Morbidity experience varies greatly with policy form, company, agent, occupation, locale, economic conditions, and other factors. There really is no standard intercompany experience table.
b) The lapse rate also varies widely, and with no common pattern.
c) Since there are ordinarily no termination benefits, the effect of incorporating lapses into reserve calculations is significant.
d) It is difficult to assess the importance of the "collectively renewable" and "guaranteed renewable" designations. How much credence can be put on past experience as a barometer for the future? What weight should be given to the company's right to refuse renewal or to increase premiums?

The entire question becomes even more complex when one realizes that statutory health reserves are often calculated on the two-year preliminary

term basis. This fact, together with the smaller excess of first-year commissions over renewal commissions, means that a priori it is not certain how GAAP reserves will compare with minimum statutory reserves. One cannot help wondering whether the adoption of this new GAAP approach is indeed progress.

One approach that has been attempted by companies under pressures of time or with a relatively small block of business is (*a*) to use net level statutory reserves and (*b*) to capitalize acquisition expenses in total (the so-called accounting or worksheet approach).

This approach should be tested prior to adoption, since it is quite clear that the combination of a high lapse rate with no concomitant withdrawal benefit will often result in substantially lower benefit reserves. It depends very much on the slope of the applicable morbidity rate.

Another ticklish question is what to do where no specific statutory reserve is required—as on collectively renewable policies with a premium that does not vary by issue age or, at least, only for very broad issue-age groups. Can we set up GAAP reserves without reconsidering the statutory basis?

OTHER COVERAGES

What should be done with riders such as accidental death and waiver of premium? Generally, statutory reserves are accepted as a reasonably good approximation to GAAP reserves. For one thing, reserves are generally already on a net level basis; also, these are term benefits with relatively small statutory reserves. The applicable acquisition expenses can be considered to be part of the life expenses already capitalized. An alternative approach would be to estimate the effect on statutory reserves of using a GAAP interest rate rather than the statutory interest rate.

Statutory reserves are generally held for reduced paid-up or extended term insurance. For one thing, the capitalized acquisition expense item has been written off. Also, the effect on earnings of making this assumption is generally small—although it may not be so on surplus. It is assumed that mortality and interest profits offset the small expenses associated with paid-up policies. If GAAP benefit reserves are computed, then a corresponding maintenance expense liability should be set up.

For "practical" reasons statutory reserves are generally held for annual premium annuities, the nondeduction benefit, and substandard policies. The amounts involved are usually small and the impact minimal. A possible exception may be in the case where relatively large amounts of substandard business are written for which a weighted adjustment to GAAP benefit reserves may be necessary.

Industrial or weekly debit insurance has such a high turnover rate that the early grading of benefit reserves into statutory reserves may be justifiable. This, of course, means that acquisition expenses are written off over a shorter period. An interesting sidelight here is that, although the first-year expense allowance inherent in the Commissioners Reserve Valuation Method may not cover first-year acquisition expenses for ordinary business, the reverse can be true for industrial insurance, since underwriting and issue expenses are small and the excess of first-year over renewal compensation is not great.

Of course, if any of the preceding items form a substantial part of the company's reserve liability, a more comprehensive analysis should be undertaken.

REINSURANCE

The action to be taken depends on the reinsurance approach.

Yearly Renewable Term

This can be considered to be the yearly purchase of term insurance and can be treated as on the Convention Blank. This is particularly true where the amount reinsured is relatively small and recapture is permitted. Some companies may wish to calculate the reserve offset (i.e., $\frac{1}{2}c_x$ times the net amount at risk), on a basis consistent with the benefit reserves.

If the amount being reinsured becomes great, then perhaps the cost of reinsurance should be another cost factor in the calculation of the benefit reserve. In essence a weighted mortality rate could be calculated, based on the approximate percentage of the business being reinsured.

An alternative approach would be to treat the reinsurance as variable premium, decreasing term insurance and compute benefit reserves using the same mortality, interest, and lapse assumptions that are inherent in the direct business benefit reserve.

Coinsurance

If the "allowance" granted by the reinsurer follows the pattern of actual expense, then all that may be required is the subtraction of GAAP reserves (both benefit and expenses) on the ceded business from the direct reserves. Where the ceding company receives a first-year allowance significantly greater than its own new-business expenses—say, 180 per cent—then a different treatment is called for, at least with respect to the expense asset. Where significant amounts are coinsured, then undoubtedly special expense assets should be calculated and tested.

If most of a policy is reinsured, we must ask the question, Is the policy self-sustaining? In essence the company may be selling the business. Much will depend on the importance of the recapture provision. While it can be argued that under such circumstances the additional first-year allowance should be taken in as current income, we disagree. A far better approach would be to capitalize the portion of the first-year allowance in excess of new-business expenses over the life of the policy or until the most likely recapture date. This would produce a method consistent with the approach presumably being used by the assuming company.

Modified Coinsurance

If we consider this to be coinsurance plus a loan, there is no problem. We end up with GAAP reserves on the retained portion and statutory reserves on the ceded portion.

OTHER PROBLEMS AND QUESTIONS

Deferred Premiums

The accountants generally seem to want the due and deferred premium asset broken down into expense and benefit portions. In essence the due and deferred benefit asset is subtracted from the benefit reserves, and the due and deferred expense asset is added to the capitalized expense asset. To accomplish this, ratios of GAAP net premiums to gross premiums must be derived.

Current expenses expressed as per cent of premium should be subtracted from the due and deferred expense ratio. In effect we are saying that commissions, taxes, and other "percentage" expenses will be realized as soon as the due or deferred premiums are paid and must be subtracted in order to come up with the appropriate asset.

Term Conversion Reserve

The use of a higher than normal mortality assumption does not really provide for this benefit. It may not be necessary, but long-duration convertible term policies do call for a testing of the materiality of this item. (As an aside it should be pointed out that under GAAP annual renewable term policies are treated as a varying premium term policy, and, although statutory reserves are minimal, benefit reserves can be substantial.)

One practical approach might call for the inclusion of a specific policyholder benefit at the last duration at which conversion can take place. In effect this fund is built up over the premium-paying period.

Related Companies

Where it happens that a life insurance company and a life insurance agency are parent and subsidiary or sister companies of a common parent, caution must be exercised. Undoubtedly, commissions that are being paid to and received by another family member cannot be capitalized.

When Assumptions and Future Experience Diverge

Assumption of a high lapse rate is not always a conservative approach. Use of the Linton C expense factors from Table 4 results in the following:

Policy Year	Expense Factors per $1,000 (Linton C)	Projection of Policies in Force (Linton C)	Actual Expense Asset
1	$36.20	0.699	$25.30
2	39.26	0.573	22.50
3	41.68	0.486	20.26
4	43.75	0.422	18.46
5	45.64	0.370	16.89
10	51.03	0.229	11.69

However, assume that the actual experience is Linton A. We then have the following results:

Policy Year	Expense Factors per $1,000 (Linton C)	Projection of Policies in Force (Linton A)	Actual Expense Asset
1	$36.20	0.899	$32.54
2	39.26	0.845	33.17
3	41.68	0.801	33.39
4	43.75	0.765	33.47
5	45.64	0.733	33.45
10	51.03	0.623	31.79

Clearly, we must test to determine not only that the expense asset is decreasing but that it is going down in an orderly and proper fashion.

CONCLUSION

GAAP benefit and expense reserves are being calculated for a new "ball game" with new ground rules. We can no longer rely on rules which were applicable to a different era. Research and further testing are required.

Even this early in the game it is quite apparent that the uniformity and consistency in approaches and assumptions predicted by the proponents of GAAP will not be realized. Some companies will try to maximize current earnings; others will hope to defer some portion of current earnings into a later period.

A mere recitation of approaches and assumptions used will not tell the entire story. What is really happening certainly will not be obvious immediately. For example, the use of a high interest rate combined with an early grading into statutory reserves can be far more conservative than the use of a lower interest rate and no merging. Similarly, as has been demonstrated in this paper, the use of a high lapse assumption is not always conservative. Here as elsewhere a "feel" for the company's operation and an intimate understanding of statutory and GAAP reserves are essential if we are to do other than merely churn and muddy the waters. This paper has been written in order to put in one place the collective experience of the authors. It is hoped that this paper will provide a forum for others to show how they put GAAP into effect.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the help of Mr. J. Claude Pedelaborde, who programmed and generated the various GAAP net premiums and reserves. We also wish to express our sincere appreciation to Mr. Saul Rosenthal, F.S.A., and Mr. James R. Bloyer, F.S.A., for reviewing the paper and offering a number of helpful suggestions.

DISCUSSION OF PRECEDING PAPER

CLAYTON A. CARDINAL:

Authors M. L. Gold and P. L. Weichert's purpose in writing their paper has been to share with us their experience. In return for this, they have asked that we respond with comments thereon or with a like sharing. In response to this entreaty, I offer two observations. The first is on the authors' adjustment for any inherent bias arising from using decennial or quinquennial age factors rather than individual ages and the use of key plans rather than all plans. The second is on reinsurance.

Adjustment for Inherent Bias

The authors indicate that primarily they have used a modeling approach to GAAP, wherein reserve factors are generated for key plans. In generating the factors, only central ages of quinquennial or decennial age groupings are recognized. In the valuation process, however, all the policies in force are made part of the valuation. The number of plans recognized is such that at least 80 per cent of the business in force in the company is on those plans. Thus we find that, in effect, the authors value the total business in force not by a seriatim and exact method but by a hybrid averaging and grouping method. The authors feel that the resulting reserves have an inherent bias which needs to be compensated for. This compensation is achieved by adjusting such reserves by a factor equal to the ratio of the statutory reserves calculated on an actual basis to the statutory reserves calculated on the model basis.

The preceding adjustment executed by the authors appears to me to lack justification. The authors themselves realize that research and testing are required for any adjustment. However, in the adjustment, have they not made the assumption (I say assumption, since no empirical evidence to the contrary is presented in the paper) that any bias in the calculation of the GAAP reserve by the model follows the same direction as the bias in the calculation of the statutory reserves by the model? The empirical testimony which I have heard to date indicates that such biases are not necessarily aligned and, accordingly, the adjustment made by the authors without a demonstrated need therefore may be improper.

It can be surmised that a seriatim approach to GAAP reserves will result in a reserve which differs from that generated by a modeling approach. Any adjustment to the reserve resulting from a modeling approach

should be such that it brings it closer to that which would result from a seriatim and exact valuation approach. At the Society's meeting in Miami last year, one actuary indicated that for one client he calculated GAAP reserves by a method identical with that described by the authors and by an exact and seriatim method. (The purpose of the double valuation was not made clear.) The speaker indicated that the type of adjustment suggested by the authors had no relationship to the type of adjustment which would be required to bring the results of the modeling approach closer to that of a seriatim and exact valuation approach. Unless it can be demonstrated that the adjustment suggested by the authors does achieve a more meaningful representation of the "true" GAAP reserves, I suggest that such adjustment is spurious and, accordingly, should not be made.

Reinsurance

The authors offer little comment on the technical problems which may be encountered in reinsurance. It is an area of interest to me, and I wish that the authors would expound more fully thereon in their response to discussants. For example, a number of companies have in force various forms of spread-loss reinsurance agreements. Under statutory accounting, the amounts recovered under a spread-loss or stop-loss/spread-loss type of agreement are not required to be recognized as a liability by most state insurance regulations. However, under GAAP such recoveries are probably properly treated as a liability, because there is a real obligation on the part of the reinsured in such agreements to pay such recoveries to the reinsurer—even though such payments are spread over many years in the future.

Another example of an agreement that can be expected to result in GAAP technical problems is the yearly renewable term agreement offered by some reinsurers on a participating or an experience-rating basis for automatic and facultative cessions wherein one-half or some other proportion of the increase in each year's reinsurance consideration is credited to the insurer in its experience-rating formula. Such "production" credits in effect constitute an advance payment of expected future experience refunds. Accordingly, under GAAP, it may be appropriate (and I think it is) that such amounts be established as a liability. For a small company with such a reinsurance agreement the implied liability may be material.

It is my understanding that the Committee on Financial Reporting Principles of the American Academy of Actuaries is preparing for release an interpretive opinion on GAAP accounting of reinsurance. Such an opinion should give the in-depth consideration of GAAP accounting of reinsurance which necessarily must be given to this important area.

FREDERICK S. TOWNSEND:

I would like to mention a few practical considerations, supplementing the comments offered by Mr. Gold and Mr. Weichert. Some companies may find that under their basic approach as few as ten policy forms may account for as much as 80 per cent of insurance issued and insurance in force. If the scattering of other plans is not a large proportion of new business issued, it may be immaterial to adjust earnings for that small block of business; in other words, it may be sufficient to report GAAP earnings for the ten or so plans comprising 80 per cent of the company's business.

The authors make the assumption that acquisition expenses will be amortized over a period of time equal in length to that in which benefit reserves are graded to statutory reserves. This has not been the case in practice.

Although the paper shows significant differences in the reserve factors in Table 2, it should be kept in mind that these are factors per thousand dollars of insurance in force. In application to aggregate insurance in force, the percentage variance arising from the choice of a grading period (into statutory reserves) may not be as significant as is suggested in Table 2.

I would agree with the authors that grading into statutory reserves is probably more conservative than using a level GAAP interest assumption for the life time of the business. However, it should be pointed out that this is a conservative assumption at the date of issue. In the case of a company adopting GAAP accounting for the first time in 1972 or 1973, the choice of using statutory reserves after twenty or twenty-five years for business issued prior to 1950 becomes a liberal assumption because it maximizes earnings immediately for companies currently adopting GAAP accounting.

I would like to suggest that Table 3, showing the effect of varying the interest assumption, is incomplete. If possible, it would be interesting to add a sixth column showing the effect of grading from an initial 3.0 percent interest assumption to an ultimate 5.0 percent interest assumption. In reviewing the GAAP financial statements issued by the Jefferson National Life Insurance Company, I find that the interest rate assumption for business issued from 1939 to 1947 is 3 per cent graded gradually for policy years 9–26 to 4.75 per cent. I have yet to see anyone publish reserve factors based upon an increasing interest rate assumption.

With respect to participating insurance, is a graded interest assumption appropriate, or should a company use a level interest assumption? If the projected dividend scale is based upon a constant interest assumption,

and if GAAP reserves are based upon a declining interest assumption, loss recognition may be called for. This situation might contradict the authors' conclusion that there is no conflict in using both graded and level assumptions.

The treatment of participating earnings with statutory limitations is a question which may go beyond the realm of the actuary. It may involve unadjudicated legal questions. Meanwhile, managements must exercise their independent judgments as to the appropriate accounting treatment.

Where companies transfer 10 per cent of participating department profits to the benefit of stockholders, they may elect to transfer either 10 per cent of statutory earnings or 10 per cent of GAAP earnings. Some companies with a 10 per cent restriction on participating department earnings, contrary to my personal interpretation of such laws, credit 100 per cent of participating department earnings and surplus to stockholders on the basis of the opinion of legal counsel that ultimately the undistributed earnings of the participating department belong to the stockholders.

In the case of participating departments which are losing money, is it appropriate to take a participating department transfer? Furthermore, if the department is losing money, should only 10 per cent of the loss or 100 per cent of the loss be reflected in stockholder earnings? Since stockholder surplus is the only source of surplus to support such losses, it could be argued that the full participating department loss should be reflected in stockholder earnings.

The preceding comments may help the reader to perceive what some companies are actually doing in practice.

(AUTHORS' REVIEW OF DISCUSSION)

MELVIN L. GOLD AND PAUL L. WEICHERT:

Mr. Cardinal's comments regarding the adjustment of GAAP reserves for inherent bias are well taken. Care should be taken before results are arbitrarily adjusted by a factor equal to the ratio of statutory reserves calculated on an actual basis to statutory reserves calculated on the model basis.

In actual practice, whenever possible, we have computed this ratio using the model plans only. Thus, in the use of decennial issue age groups, it would seem reasonable to expect an inherent age bias that should be adjusted for. For example, age 35 is not an exact midpoint for the age 30–39 group.

Mr. Cardinal offers some suggestions on the proper treatment of certain types of reinsurance arrangements that were not discussed in the paper.

Of course, GAAP accounting of reinsurance can be very critical for some companies, and it will certainly be most helpful if the Academy of Actuaries releases an interpretive opinion regarding reinsurance.

Mr. Townsend sets forth some very helpful practical considerations and ideas. We certainly agree that grading into statutory reserves may not be conservative for a block of business that is older than the grading period.

Mr. Townsend points out that in certain situations it may be appropriate to adopt an increasing interest assumption.

Mr. Townsend raises several vital questions concerning participating insurance, especially concerning transfers of earnings to the stockholders' account. It will be interesting to see how these questions are resolved as companies with large amounts of participating business convert to a GAAP basis.