

THE USE OF ASSET SHARE AND MODEL OFFICE
TECHNIQUES IN GROUP INSURANCE PLANNING

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THIS paper describes an approach to the problem of long range planning that a group insurance writing company might use in attempting to determine the most desirable rate of growth. In addition, these techniques may also be used for testing premium and dividend scales as will also be illustrated.

The very small surplus margins that exist in group insurance premium rates, particularly in group Accident and Health, emphasize the importance of planned growth. A poorly planned growth pattern may lead small margins to become large losses. The impact on company surplus of the investment required to start and expand group insurance production must be fully appreciated.

The techniques illustrated are not original with the author and to a large extent are obvious applications of approaches long used in individual life insurance. However, while there are many illustrations of asset shares and model offices for ordinary in actuarial literature, there is a dearth of such for group insurance.

The paper is written from the point of view of a company which is about to enter or has recently entered the group insurance field, with comments as to appropriate adjustments to the illustrations that might be made by companies well established in group insurance. To simplify the illustration, the model office insurance company is assumed to write only one year renewable term group life and Accident and Health insurance.

The first step is to determine what the long range experience of one year's issue for various coverage and various size policies can be expected to be. It is assumed that the company has devised a satisfactory premium rate structure and group insurance dividend formula. A review of the derivation of the premium rate structure should indicate what percentage of the premium can be expected to be required for claims each year, whether for actual paid claims or for claim reserves. This percentage will tend to be higher for larger size cases since the premium structures of most companies include volume reduction formulas to reflect the fact that a smaller percentage of the premium is required for expenses on larger policies.

The determination of what percentage of the premium will be paid out

in dividends requires assumption as to the characteristics of the business which it is expected will be written. Dividend formulas normally reflect the claims experience of each individual case, except those so small as to require complete pooling, as well as the experience of the class of business, through credibility factors. They also reflect the type of coverage, amount of premium, number of lives, type of premium accounting used, whether the employees contribute or not, type of commission scale being used on the policy, etc.

The choice of what typical characteristics to use in projecting dividends involves a compromise between accuracy and the necessity of keeping the number of projections to be calculated at a reasonable level. The projections calculated should vary in characteristics sufficiently so that each is felt to represent a block of business which is basically different from any other and yet the block should represent a fairly broad grouping of individual policies.

Errors in assumptions as to type of commissions paid, type of accounting, basis of participation, etc., will cause errors in projected expenses that will be offset to some extent by resulting errors in the projected dividends, since the amount of the dividends depends on these assumptions.

Expenses are charged against individual group policies in group dividend formulas through the use of factors such as a percentage of premium, a constant per policy, a constant per rider and a constant per life covered. The percentage of premium may decrease with increasing amount of premium. The factors used in the first year are normally higher to reflect the higher costs of acquisition.

Table 1 gives a summary of the assumptions, including typical dividend formula expenses, used in calculating the expected premiums, claims, expenses and dividends in Table 2. While reference was made to industry averages in developing these assumptions, they should be considered as illustrative only since there is considerable variation from company to company in these factors and such averages are subject to substantial change with the passage of time. These same precautionary words apply to the succeeding tables as well.

The choice of the number of years to run the dividend projections will depend on the purpose for which they are run. If they are for measuring present value of future profits, anything over 20 years would appear superfluous because the discounted value of any profits beyond that point will be relatively small.

The small amounts of interest that might be earned on such liabilities as claim reserves and unearned premium reserves have been ignored, although they could be taken into account if felt to be significant.

TABLE 1
ASSET SHARE ASSUMPTIONS

	Life	Weekly Disability Income	Medical Care Coverages
1) Incurred Claims as Percentage of Premium:			
25 Lives.....	63.67%	63.6%	68.0%
100 Lives.....	70.0	75.0	72.2
300 Lives.....	74.5	77.3	74.5
1,000 Lives.....	77.8	80.6	79.5
2) Average Monthly Premium per Employee Life Insured:			
25 Lives.....	\$4.180	\$2.887	\$8.240
100 Lives.....	3.800	2.625	7.760
300 Lives.....	3.572	2.546	7.520
1,000 Lives.....	3.420	2.441	7.040
3) Maintenance Expenses:			
25 Lives.....	\$ 119	\$ 188	\$ 287
100 Lives.....	246	323	681
300 Lives.....	298	503	1,548
1,000 Lives.....	685	1,326	4,544
4) Additional First Year Expenses:			
25 Lives.....	\$ 653	\$ 492	\$1,397
100 Lives.....	2,124	1,608	4,012
300 Lives.....	4,426	3,712	5,101
1,000 Lives.....	6,661	6,426	7,030

5) Writing Agents Commissions:

AMOUNT OF PREMIUM TO WHICH COMMISSION RATES APPLY	REGULAR SCALE (25 and 100 Life Policies)		LEVEL SCALE (300 and 1,000 Life Policies)
	1st Year	Years 2-10	Years 1-10
First \$ 1,000..	20.00%	5.00%	7.00%
Next 4,000..	20.00	3.00	5.25
Next 5,000..	15.00	1.50	3.25
Next 10,000..	12.50	1.50	3.00
Next 10,000..	10.00	1.50	2.70
Next 20,000..	5.00	1.50	2.00
Next 50,000..	2.50	1.00	1.25
Both Scales pay $\frac{1}{2}$ % in the 11th year and subsequent			

- 6) Overriding Commission..... 20% of writing agent's commissions.
7) State Premium tax..... 2% of premium.
8) Accounting..... Policyholder assumed to perform premium billing and maintenance of employee record cards on 300 and 1,000 life policies.
9) Participation..... Employees assumed to contribute towards cost of insurance.

TABLE 2
EXPERIENCE PROJECTION

Coverage	Lives	Policy Year	Earned Premium (1)	Incurred Claims (2)	Incurred Dividends (3)	Commissions plus Taxes (4)	Other Formula Expenses (5)	Excess (1)-(2)-(3)-(4)-(5)
Life.....	25	1	\$ 1,254	\$ 798	\$ 0	\$ 326	\$ 772	.....
		10	1,254	798	74	94	119	.....
		20	1,254	798	162	33	119	.....
		PV*	11,542 (100.0%)	7,345 (63.6%)	455 (3.9%)	938 (8.1%)	1,739 (15.1%)	\$1,065 (9.3%)
	100	1	4,560	3,192	36	1,185	2,370	.....
		10	4,560	3,192	206	279	246	.....
		20	4,560	3,192	560	118	246	.....
		PV*	41,971 (100.0%)	29,380 (70.0%)	2,049 (4.9%)	3,050 (7.3%)	4,357 (10.4%)	3,135 (7.4%)
	300	1	12,859	9,576	485	891	4,724	.....
		10	12,859	9,576	1,171	891	298	.....
		20	12,859	9,576	1,746	335	298	.....
		PV*	118,358 (100.0%)	88,140 (74.5%)	9,311 (7.9%)	6,781 (5.7%)	7,104 (6.0%)	7,022 (5.9%)
	1,000	1	41,040	31,920	3,558	2,301	7,346	.....
		10	41,040	31,920	5,137	2,301	685	.....
		20	41,040	31,920	6,339	1,067	685	.....
		PV*	377,743 (100.0%)	293,799 (77.8%)	45,102 (11.9%)	18,028 (4.8%)	12,868 (3.4%)	7,946 (2.1%)
Weekly Disability Income.....	25	1	\$ 866	\$ 551	\$ 0	\$ 225	\$ 680	.....
		10	866	551	0	69	188	.....
		20	866	551	0	22	188	.....
		PV*	7,971 (100.0%)	5,071 (63.6%)	0 (0.0%)	669 (8.4%)	2,215 (27.8%)	\$ 16 (0.2%)
	100	1	3,150	2,363	0	819	1,931	.....
		10	3,150	2,363	0	200	323	.....
		20	3,150	2,363	186	82	323	.....
		PV*	28,993 (100.0%)	21,749 (75.0%)	316 (1.1%)	2,149 (7.4%)	4,557 (15.7%)	222 (0.8%)

* Present value at issue of first twenty policy years.
 Note.—In the interest of saving space figures are shown only for selected durations.

The calculation of present values in this table and the calculation of Table 4 assume figures are available for all intermediate durations.

TABLE 2—Continued

Coverage	Lives	Policy Year	Earned Premium (1)	Incurred Claims (2)	Incurred Dividends (3)	Commissions plus Taxes (4)	Other Formula Expenses (5)	Excess (1)-(2)-(3)-(4)-(5)	
Weekly Disability Income.....	300	1	\$ 9,167	\$ 7,088	\$ 0	\$ 682	\$ 4,215	.....
		10	9,167	7,088	545	682	503	.....
		20	9,167	7,088	1,089	238	503	.....
		PV*	84,376 (100.0%)	65,240 (77.3%)	3,995 (4.7%)	5,143 (6.1%)	8,288 (9.8%)	\$ 1,710 (2.1%)	
	1,000	1	29,295	23,625	341	1,778	7,752	.....
		10	29,295	23,625	1,631	1,778	1,326	.....
		20	29,295	23,625	3,011	762	1,326	.....
		PV*	269,639 (100.0%)	217,450 (80.6%)	14,337 (5.3%)	13,770 (5.1%)	18,537 (6.9%)	5,544 (2.1%)	
	Medical Care.....	25	1	\$ 2,472	\$ 1,680	\$ 0	\$ 642	\$ 1,684
			10	2,472	1,680	79	162	287
20			2,472	1,680	273	64	287	.....
PV*			22,753 (100.0%)	15,463 (68.0%)	791 (3.5%)	1,713 (7.5%)	4,018 (17.7%)	\$ 768 (3.3%)	
100		1	9,312	6,720	220	2,165	4,693	.....
		10	9,312	6,720	925	467	681	.....
		20	9,312	6,720	1,285	242	681	.....
		PV*	85,710 (100.0%)	61,852 (72.2%)	6,320 (7.4%)	5,397 (6.3%)	10,221 (11.9%)	1,920 (2.2%)	
300		1	27,072	20,160	1,184	1,661	6,649	.....
		10	27,072	20,160	2,957	1,661	1,548	.....
		20	27,072	20,160	3,999	703	1,548	.....
		PV*	249,177 (100.0%)	185,557 (74.5%)	24,373 (9.8%)	12,842 (5.2%)	19,274 (7.7%)	7,131 (2.8%)	
1,000		1	84,480	67,200	3,304	3,902	11,574	.....
		10	84,480	67,200	7,295	3,902	4,544	.....
		20	84,480	67,200	8,884	2,196	4,544	.....
		PV*	777,574 (100.0%)	618,525 (79.5%)	62,104 (8.0%)	31,558 (4.1%)	48,751 (6.3%)	16,636 (2.1%)	

Group policies have a tendency to grow in size with increasing duration because of inflation in claim costs, growth in number of employees per case due to plant expansion, etc. However, the assumption that policies remain the same size with duration is made to simplify the illustration.

It should be pointed out that the dividends incurred under a typical dividend formula will be larger if the policies to which it is applied have a large dispersion of claim ratios averaging to a class claim ratio of, say, 70%, than if each of the policies taken individually has a 70% claim ratio. The reason for this is that each dollar of increase in claims on a case that already has claims greater than the premium does not reduce the dividend, since the dividend would already be zero, while each dollar reduction in claims on a case with good experience will increase the dividend by some portion of that dollar, depending on the credibility assigned to the experience of the individual case. This phenomenon must be adequately reflected in the dividend projection. The method of reflecting it will, of course, depend on the characteristics of the particular dividend formula.

The dividend projections in Table 2 can be used to determine the present value of future profits resulting from the premium rate structure and the dividend formula. The figures at the bottom of each column represent the sum of each of the values in the column discounted to the time of policy issue. For this purpose a 6.4% annual policy lapse rate and 3% interest rate were used.

The present values were calculated for the t th year by application of the factor $(.936)^{t-1}/(1.03)^{t-1/2}$. This assumes all payments are made in the middle of the policy year and all lapses occur at the end of the policy year.

The adequacy of the present value of future profits will depend on the company's surplus objectives balanced against its objectives concerning its relative competitive position. The projections for group life insurance show the more substantial surplus margins in group life rates than in group Accident and Health rates. This is generally characteristic of the group insurance industry today because of the time lag between increasing medical care costs and increasing premium rates. The projections also show the tendency for profits to be smaller as a percentage of premium on larger policies than on smaller policies. This reflects the greater competitive pressures on net cost on larger cases.

The relative proportion of business to be expected from each major product line and from each size category must be determined. This requires a knowledge of how the product is to be marketed. For example, a company relying heavily on its own ordinary or debit agents to produce group business will write relatively more small groups than a company

relying on salaried group field representatives and brokerage contacts. The relative competitiveness of rates will influence the relative proportion of business written in each line. The assumed mix of business used in the illustration is shown in Table 3.

The figures in Table 4 are the sum of the figures for each coverage type

TABLE 3
MODEL OFFICE DISTRIBUTION
PERCENTAGE OF PRODUCTION MEASURED IN
PREMIUM DOLLARS ATTRIBUTED TO EACH TYPE
OF COVERAGE AND SIZE CATEGORY

Coverage	Number of Lives	Percentage
Life.....	25	15.0%
	100	17.5
	300	10.0
	1,000	7.5
Weekly Disability Income.....	25	5.3
	100	6.1
	300	3.5
	1,000	2.6
Medical Care.....	25	9.7
	100	11.4
	300	6.5
	1,000	4.9

TABLE 4
EXPERIENCE PROJECTION FOR ONE YEAR'S ISSUE
(All Coverages and Size Categories)

Policy Year	Earned Premium	Incurred Claims	Incurred Dividends	Commissions plus Taxes	Other Formula Expenses	Current Year Surplus and Profit	Accumulated Surplus and Profit
	(1)	(2)	(3)	(4)	(5)	(6)*	(7)†
1.....	\$100,000	\$71,382	\$1,941	\$18,736	\$48,164	-\$40,223	-\$40,822
2.....	93,600	66,814	2,423	5,961	6,931	11,471	- 30,405
3.....	87,610	62,538	2,662	5,580	6,488	10,342	- 20,821
4.....	82,000	58,533	2,845	5,222	6,072	9,328	- 11,979
5.....	76,750	54,786	3,026	4,888	5,683	8,367	- 3,847
6.....	71,840	51,281	3,155	4,575	5,320	7,509	3,658
7.....	67,240	47,997	3,164	4,282	4,979	6,818	10,687
8.....	62,940	44,928	3,303	4,008	4,661	6,040	17,138
9.....	58,910	42,051	3,526	3,752	4,362	5,219	22,949
10.....	55,140	39,360	3,558	3,512	4,080	4,630	28,336

* Col. (6) = Col. (1)-Col. (2)-Col. (3)-Col. (4)-Col. (5).

† Col. (7)_t = Col. (7)_{t-1}(1.03) + Col. (6)_t(1.03)^{1/2}.

and size from Table 2 after adjusting each of them to a radix of \$100,000 of initial premium and multiplying each by the percentages from Table 3. The decreasing premium also reflects an assumed annual policy termination rate of 6.4%. Study of this factor might indicate significant variation by duration, although termination rates are more nearly level by duration for group insurance than for ordinary insurance.

The figures to be used in the model office projection are shown for 10 years only. Longer projections could be made, depending on the purpose of the projection.

A determination of expected production and current in-force is now necessary. The basis for this projection will depend greatly on how the product is to be marketed. For a company which is going to rely mainly on salaried group men it might be conducted as follows. Production is

TABLE 5
 PRODUCTION BY GROUP FIELD MEN
 Amount of Annual Production in Terms of Annual Premium
 for Group Insurance Salaried Field Representatives

1st calendar year of service.....	\$ 10,000*
2nd calendar year of service.....	40,000
3rd calendar year of service.....	60,000
4th calendar year of service.....	80,000
5th calendar year of service and later.....	100,000

* This is intended to reflect only one-half year of service in the calendar year of hiring.

assumed to be related directly to the number of group field men with consideration for their length of experience selling group insurance. Table 5 shows an illustrative pattern of production for each group field man.

The projected field force can be built up as shown in Table 6, assuming an annual termination rate of field men of 10% in the first year and 5% in each year of service thereafter.

Two assumptions as to possible patterns of growth are shown in order to illustrate the varying effect on production, in-force and contribution to surplus. The second assumption illustrates a more rapid growth of the field force in the first few years to the same ultimate level as the first assumption. Whether such a rapid rate of growth is desirable would depend in part on the ability of the company to train men, open new field offices and expand the home office staff rapidly enough to handle the resulting production, as well as the effects on surplus. The former considerations are beyond the scope of this paper however.

After multiplying the number of men in each year-of-service cell by the amount of production per man and summing, the resulting projected production figures are given in column (1) of Table 7. The projected produc-

tion figures might be further increased by some amount that is assumed to be independent of the group field men. Even a company relying primarily on group field men for production will receive a certain amount of business through its ordinary agents or home office contacts which involve no effort on the part of group field men.

To project earned premium, incurred claims, incurred dividends, etc., it is assumed that the production occurs on the average in the middle of the calendar year of production. Thus, for example, the earned premium in the first calendar year of the projection will be half of that year's production. The new business earned premium in the second year will be half of the first year's production plus half of the second year's production. To determine the total earned premium for the n th year, we need merely multiply the new business earned premium in the t th year by the premium remaining in force in the $(n - t + 1)$ th policy year from Table 4,

TABLE 6
MODEL OFFICE—NUMBER OF GROUP FIELD MEN

YEAR OF PROJECTION	TOTAL	YEAR OF SERVICE				
		1st Year	2nd Year	3rd Year	4th Year	5th Year and Later
Assumption 1						
1....	10.00	10.00	.....	.....	.....	.....
2....	19.00	10.00	9.00	.....	.....	.....
3....	27.55	10.00	9.00	8.55	.....	.....
4....	35.67	10.00	9.00	8.55	8.12	.....
5....	43.38	10.00	9.00	8.55	8.12	7.71
6....	50.70	10.00	9.00	8.55	8.12	15.03
7....	57.65	10.00	9.00	8.55	8.12	21.98
8....	64.25	10.00	9.00	8.55	8.12	28.58
9....	70.52	10.00	9.00	8.55	8.12	34.85
10....	76.48	10.00	9.00	8.55	8.12	40.81
Assumption 2						
1....	18.00	18.00	.....	.....	.....	.....
2....	34.20	18.00	16.20	.....	.....	.....
3....	49.59	18.00	16.20	15.39	.....	.....
4....	64.21	18.00	16.20	15.39	14.62	.....
5....	78.10	18.00	16.20	15.39	14.62	13.89
6....	77.30	4.00	16.20	15.39	14.62	27.09
7....	77.24	4.00	3.60	15.39	14.62	39.63
8....	77.18	4.00	3.60	3.42	14.62	51.54
9....	77.12	4.00	3.60	3.42	3.25	62.85
10....	77.07	4.00	3.60	3.42	3.25	62.80

divide by \$100,000 and sum for t from 1 to n . Similar calculations are performed for projected incurred claims, incurred dividends, etc. The results, shown in Table 8, reveal the emergence of surplus on the assumption that actual expenses are incurred exactly as anticipated by the dividend formula factors. These figures make no adjustment for federal income tax. It might be desirable to make an approximate adjustment for this tax on the basis that the income tax will take away \$.26 of every dollar of profit and give back this amount of every dollar of loss, based on the current tax law, for stock companies. There is apt to be little or no effect on taxes for a mutual company.

The above figures are for future production only. If a company has significant amount of in-force already on the books, the expected future profits on this business should tend to be higher than on currently written

TABLE 7
MODEL OFFICE PRODUCTION AND NEW BUSINESS
EARNED PREMIUM

Year of Projection	Production (1)	New Business Earned Premium (2)*
Assumption 1		
1.....	\$ 100,000	\$ 50,000
2.....	460,000	280,000
3.....	973,000	710,500
4.....	1,622,600	1,297,800
5.....	2,393,600	2,008,100
6.....	3,125,600	2,759,600
7.....	3,820,600	3,437,100
8.....	4,480,600	4,150,600
9.....	5,107,600	4,794,100
10.....	5,703,600	5,405,600
Assumption 2		
1.....	\$ 180,000	\$ 90,000
2.....	828,000	504,000
3.....	1,751,400	1,289,700
4.....	2,921,000	2,336,200
5.....	4,310,000	3,615,500
6.....	5,490,000	4,900,000
7.....	6,240,000	5,865,000
8.....	6,712,800	6,476,400
9.....	6,934,200	6,823,500
10.....	6,929,200	6,931,700

* Col. (2)_t = $\frac{1}{2}$ [Col. (1)_{t-1} + Col. (1)_t].

TABLE 8
MODEL OFFICE EXPERIENCE BASED ON DIVIDEND FORMULA EXPENSES

Year of Projection	Earned Premium (1)	Incurred Claims (2)	Incurred Dividends (3)	Commissions plus Taxes (4)	Other Formula Expenses (5)	Current Year Surplus and Profit (6)*	Accumulated Surplus and Profit (7)†
Assumption 1							
1.....	\$ 50,000	\$ 35,691	\$ 971	\$ 9,368	\$ 24,082	- \$ 20,112	- \$ 20,411
2.....	326,800	233,276	6,646	55,441	138,325	- 106,888	- 129,503
3.....	1,022,385	729,799	22,023	153,725	367,746	- 250,908	- 388,032
4.....	2,254,752	1,609,487	51,427	304,104	695,935	- 406,201	- 811,922
5.....	4,118,541	2,939,897	98,975	510,652	1,123,459	- 554,442	-1,398,977
6.....	6,614,534	4,721,587	167,203	762,559	1,614,592	- 651,407	-2,102,052
7.....	9,664,264	6,898,545	256,753	1,045,035	2,131,240	- 667,309	-2,842,358
8.....	13,196,286	9,419,773	367,695	1,353,776	2,668,928	- 613,886	-3,550,655
9.....	17,145,734	12,238,968	499,979	1,684,898	3,223,669	- 501,780	-4,166,426
10.....	21,453,896	15,314,220	653,624	2,034,909	3,791,930	- 340,787	-4,637,280
Assumption 2							
1.....	\$ 90,000	\$ 64,244	\$ 1,747	\$ 16,868	\$ 43,348	- \$ 36,207	- \$ 36,746
2.....	588,240	419,898	11,963	99,795	248,984	- 192,400	- 233,113
3.....	1,840,293	1,313,640	39,641	276,704	661,943	- 451,635	- 698,466
4.....	4,058,714	2,897,191	92,572	547,412	1,252,761	- 731,222	-1,461,529
5.....	7,414,444	5,292,591	178,177	919,344	2,022,685	- 998,353	-2,518,592
6.....	11,839,883	8,451,565	299,685	1,360,045	2,873,940	-1,145,352	-3,756,555
7.....	16,947,058	12,097,178	453,051	1,804,649	3,645,453	-1,053,273	-4,938,207
8.....	22,338,730	15,945,869	631,418	2,223,638	4,293,909	- 756,104	-5,853,715
9.....	27,732,390	19,795,978	830,738	2,610,063	4,834,774	- 339,163	-6,373,539
10.....	32,889,026	23,476,846	1,038,971	2,951,845	5,260,733	160,631	-6,401,723

* Col. (6) = Col. (1)-Col. (2)-Col. (3)-Col. (4)-Col. (5).

† Col. (7)_t = Col. (7)_{t-1}(1.03) + Col. (6)_t(1.03)^{1/2}.

new business, since the acquisition expenses have already been incurred. One possible way of reflecting existing premium in force at the start of the projection would be to break it down by duration since issue at the start of the projection and apply the figures from Table 4 to these figures at the proper duration. This would assume, for example, that the future claim ratio on existing business will be the same as the expected claim ratio on future business, and that the same mix of business applies to existing business as to future business.

A comparison of columns (6) and (7) for the two production assumptions reveals the impact of a more rapid rate of expansion. The more rapid rate of expansion causes a higher maximum investment by the company in its group department occurring at an earlier date. The maximum investment under assumption 2 is \$6,401,723 in the tenth year, while the maximum investment under assumption 1 will probably occur in the twelfth or thirteenth year for an amount somewhat in excess of the accumulated investment of \$4,637,280 in the tenth year. The expected production after the tenth year for the two assumptions will be quite similar if the field forces are maintained at the tenth year level. However, the more rapid early expansion has produced a considerably greater volume of business in force which will result in a more rapid reduction of the maximum investment.

Projecting the expenses of the group department, other than state premium taxes and commissions, from factors included in the group dividend formula may well be greatly inaccurate, particularly in the early years of a new operation when the costs of setting up the operation will far exceed what the business written in early years can be expected to absorb in view of competition. It is not the purpose of this paper to dwell on techniques of estimating future expenses. For a company which is about to enter or has just entered the group insurance business it may be necessary to seek outside advice. If the company is an established company or has personnel with considerable group insurance administrative experience, it may be possible to project expenses by asking the individual responsible for each individual function, such as accounting, claims, actuarial, sales, underwriting, etc., to estimate budget requirements for each year of the projection in view of the anticipated activity resulting from the in-force and production figures.

In such an expense projection there may be considerable argument for including only direct expenses of the group department. "Direct expenses" is meant to include all expenses that would be charged to ledger accounts specifically labeled as group department expenses. This normally would not include such items as a share of the company president's salary, the cost of the personnel department, general advertising costs,

etc. The New York State Insurance Department permits a company to exclude from the expenses charged to a new line of business in its annual statement any expenses not directly arising from that line of business, until the line of business is well established. In other words, the other more mature lines of business are charged with all such items of expense. Also it may be argued that a large part of the indirect expenses that might be charged to a new line of business in the Gain and Loss exhibit of the Convention Blank might exist even if the new line of business did not, so that a measure of the line's drain on the company or contribution to the company should not include these expenses.

An illustration of the model office experience based on projected budget expenses rather than formula expenses is included in Table 9 for the two

TABLE 9
MODEL OFFICE EXPERIENCE BASED ON PROJECTED BUDGET EXPENSES

Year of Projection	Projected Budget (1)	Excess of Formula Expenses over Projected Budget (2)*	Accumulated Excess (3)†	Accumulated Surplus and Profit (4)‡
Assumption 1				
1.....	\$ 75,000	-\$ 50,918	-\$ 51,676	-\$ 72,087
2.....	225,000	— 86,675	— 141,192	— 270,695
3.....	400,000	— 32,254	— 178,162	— 566,194
4.....	600,000	95,935	— 86,143	— 898,065
5.....	850,000	273,459	188,803	— 1,210,174
6.....	1,150,000	464,592	665,976	— 1,436,076
7.....	1,500,000	631,240	1,326,594	— 1,515,764
8.....	1,850,000	818,928	2,197,513	— 1,353,142
9.....	2,200,000	1,023,669	3,302,349	— 864,077
10.....	2,500,000	1,291,930	4,712,585	75,305
Assumption 2				
1.....	\$ 125,000	-\$ 81,652	-\$ 82,868	-\$ 119,614
2.....	400,000	— 151,016	— 238,619	— 471,732
3.....	750,000	— 88,057	— 335,146	— 1,033,612
4.....	1,150,000	102,761	— 240,909	— 1,702,438
5.....	1,600,000	422,685	180,842	— 2,337,750
6.....	2,150,000	723,940	920,986	— 2,835,569
7.....	2,650,000	995,453	1,958,890	— 2,979,317
8.....	3,000,000	1,293,909	3,330,831	— 2,522,884
9.....	3,350,000	1,484,774	4,937,637	— 1,435,902
10.....	3,600,000	1,660,733	6,771,226	369,503

* Col. (2) = Table 8, Col. (5) - Table 9, Col. (1).

† Col. (3)_t = Col. (3)_{t-1}(1.03) + Col. (2)_t(1.03)^{1/2}.

‡ Col. (4) = Col. (3) + Table 8, Col. (7).

assumptions. The projected budgets shown in column (1) are considerably less than the dividend formula expenses since, as explained above, the former are direct expenses only.

Column (4) shows a maximum investment of \$1,515,764 in the seventh year for assumption 1 and \$2,979,317 in the seventh year for assumption 2. Just as in Table 8, this shows a higher level of investment required for the more rapid expansion program. However, in spite of this both plans have resulted in complete payoff of the investment by the tenth year, with a better surplus picture in prospect after the tenth year under assumption 2 due to the greater in-force. Based on the assumptions in the projection, the necessary conclusion is that the earliest possible achievement of the ultimately desired size of the field force produces the best surplus prospects, but only at the cost of a higher level of maximum investment.

A great danger in the preparation of a projection such as that described above is that the company management, not sophisticated in the problems of group insurance, may attach an unwarranted degree of accuracy to the figures. For example, the probable error in claim ratios is large compared with the margins in typical group insurance rates and will not be fully offset by changes in dividends, as explained previously. A device such as illustrated is not a flat prediction of what is going to happen, but merely a tool which management may use as an aid in deciding what rate of expansion appears best. Also, comparison of actual results with projected figures and the underlying assumptions after the expansion program has been under way for several years may indicate what corrective action is necessary, if any, to get profit back to proper levels.

I wish to thank Mr. George E. Immerwahr for his kind suggestions during the preparation of this paper. Any failings in the paper, however, remain the author's alone.

DISCUSSION OF PRECEDING PAPER

JOSEPH W. MORAN:

Mr. Bartlett defines his objective as that of illustrating a *technique* for developing comparative data useful in one aspect of group insurance management decision making. It seems to me that he has succeeded in meeting this objective. The ideas presented in his paper are a valuable starting point for any actuary faced with such problems, and his paper should stimulate actuaries to develop a more scientific approach in dealing with other fundamental problems that face them in the planning and management of their companies' group operations.

My comments will relate principally to some possible extensions and refinements of the techniques illustrated, so that they might be used to obtain comparable data for reaching decisions on other questions.

However, I feel compelled to prefix these remarks with the general observation that the *figures* shown in the paper *should not* be accepted as representative of realistic projections which might be made for group insurance operations commencing today, since they are based on several assumptions which I consider to be rather unrealistic. Following are specific comments on these points.

Comments on Assumptions

1. The most unrealistic assumption, which appears in Table 1, is that incurred claims on medical care coverage will be 68% of premium for 25-life cases. This assumption is inconsistent with the estimates of many group actuaries that the incurred claim ratios expected in 1962 for small cases at typical premium rates currently charged for new business are 80% or higher. Mr. Bartlett's illustrations are thus applicable only to a company which staffs its group underwriting organization with clairvoyant geniuses or a company which charges premium rates about 20% above the competitive level of premium rates generally prevailing in the group health insurance market. If this latter assumption were so, the Company's efforts to acquire any large volume of group insurance would undoubtedly prove to be a monumental failure.

2. Equally unrealistic is the assumption that claim rates remain unchanged for medical care coverage from year to year. This is contrary to all past experience which leads actuaries to estimate that claim costs increase at a rate of 5% to 10% per year. This unrealistic assumption enables Mr. Bartlett to simplify his projections and illustrations considerably, but it removes from his paper any illustration of how the technique

may be applied to decision-making on renewal premium rate levels, without which his techniques may be of limited practical value.

3. Another questionable assumption in Table 1 is that the average monthly premium per employee for medical care coverage is \$8.24 or less; a more realistic average would be at twice this level. This assumption of a very low per-capita premium for medical care coverage distorts further the questionable assumptions in Table 3 as to the distribution of new business premiums by type of coverage. It would be more realistic to assume that 65% (rather than 32½%) of all premium will be for medical care coverage.

4. The assumption implicit in Table 3, that the number of cases in each size range with life insurance is three times the number of cases in the same size range with medical care coverage does not appear to distort the aggregate model office results in Table 4 and Table 8 significantly. However, if the assumption as to the level of claims incurred on medical care coverage had been more realistic, the distortions arising from such unrealistic product mix assumptions would be significant.

5. The assumptions as to new premium production of group field men in Table 5 seem unrealistic in their failure to recognize that the volume of production from the average field man will depend in part upon the proportion of his time that he is free to devote to selling efforts. In other words, as the volume of business in force builds up, there will be some tendency for sales productivity to decrease because of the servicing demands placed on the field men.

6. The assumptions in Table 6 as to the persistency rate of group field men seem unrealistically optimistic. Since productivity of group field men is presumed to vary by length of service, any realistic estimate of average per-case selling costs will be distorted significantly by unrealistic estimates of the experience of the field force.

7. The amounts shown in column (5) of Table 8 were derived by assuming that all extra expenses attributable to the first policy year are incurred as premium is earned during the first policy year, so that at the end of the calendar year during which the business was written, only 50% of such expenses have been incurred. But virtually all of these expenses are selling costs, most of which are actually incurred at (or prior to) the date on which coverage becomes effective, so the assumption seems to be unrealistic. If these sales costs are estimated realistically, the failure to charge them at the time they are incurred will introduce a considerable distortion in the model office projection in Table 8. For example, on new business production assumption 1 for the tenth year, the amount of such extra first year expenses is over \$2,200,000, and the amount of

expenses actually incurred by the end of the 10th year, but not yet charged in column (5) of Table 8, is over \$1,100,000; thus the figures for accumulated "surplus" at the end of 10 years in column (7) of Table 8 are more than \$1,000,000 too optimistic.

8. In essence, the validity of the whole projection of results hinges entirely on the reliability of the projection of expenses. Table 9 is the only place in the paper where any expense projection is used. Thus the author has rather effectively nullified any possibility that the preceding Tables 2, 4 and 8, all of which are based instead on projections of dividend formula expense charges, might be of useful significance.

This makes it even more unfortunate that the paper does not describe the assumptions used in deriving the budget projections in Table 9 at least as fully as the assumptions used in deriving the less meaningful figures for dividend formula expense charges, so that the validity of these assumptions may be reviewed.

The assumptions in Tables 5, 6, and 7 as to productivity of the group field force automatically lead to variations by year of issue in the actual rates of those expenses which represent selling costs. It is only logical to expect also that the actual rates of administrative expenses for in-force business will vary among calendar years as the volume in force changes. This means that any realistic projections of experience, corresponding to Tables 2 and 4, would have to show different results at each policy year of duration for each year's issues. In sacrificing meaningfulness of the figures projected in the various tables, the author's "bulk adjustment" method thus gains a considerable advantage in reducing the complexity of a more direct projection of realistic figures.

In my opinion, these observations as to validity of assumptions do not significantly affect the utility of the techniques illustrated or the value of the author's demonstration of them. It should be noted that they will also apply with equal force to my own presentation of variations in the technique, which follows next.

Extensions of Model Office Technique

The principal step which makes the technique more useful is to divide the model office into two separate parts and to project results for these two parts separately. Part I of the model office represents the company's new business sales operations and Part II is the company's operations for maintenance of in-force business.

Part I projections will relate to the amounts of new business premium produced, the costs of acquiring new business, and the "asset value" to the company of the new business at the time it is sold. Part II projections

will relate to the amounts of "current margins" realized at various times from the maintenance of in-force cases, and changes in the "asset values" of in-force business resulting from current year operations and lapses, etc.

In my opinion this division of the model office serves several purposes. It facilitates direct estimation and projection of expenses and other results on a realistic basis without the complexity of separate complete projections for each year-of-issue block of new business. It also affords better flexibility for evaluating directly the effects of alternative assumptions. Most important, it makes the technique versatile enough to use in evaluating concepts and factors which are not so easily evaluated by the "indirect" projection method used in the paper.

As used above, the term "current margin" refers to the excess of premium for the current year over the sum of claims, commissions, taxes and expenses incurred in that year, except that any amounts of commission and expense which represent acquisition costs are omitted from the calculation. "Acquisition cost" refers to the sum of the amounts by which commissions and expenses for the first year exceed the corresponding commissions and expenses for renewal years. Thus "current margin" is the current return on the past "acquisition cost" investment in the block of business.

The "asset value" of a block of in-force business is the present value of the aggregate of the current margins expected in future years, with appropriate discounting of such margins for anticipated lapses and for interest at a rate consistent with the anticipated investment return on other assets in the company's portfolio.

The asset value of in-force business is a concept not generally developed by the model office technique of analysis, which is designed specifically to illustrate year-to-year effects on "surplus." In contrast to the accounting and financial management concepts used in other businesses, life insurance company assets and "surplus" are computed by rules which assign zero value to the company's in-force policies, which are its most important income-producing capital assets. If projections are to be useful for a realistic evaluation of the financial status of operations, they should produce projected asset values of in-force business as well as projected surplus figures. Of course, the actuary has discretion over a wide area as to degree of conservatism employed in computing these asset values, so these will tend to be a reflection of assumptions used rather than a prediction of results.

Table A shows one illustration of the use of this "asset value" concept, derived from the experience projections of Mr. Bartlett's paper. Table 2 shows for each type of coverage a present value of margins (premium over the sum of claims, dividends, commissions, taxes and formula ex-

pense charges) projected over a 20-year period. This figure represents the excess of "formula asset value" at issue over "formula acquisition costs," discounted for lapses and for interest at 3%. Table A illustrates a direct comparison of these formula asset values, formula acquisition costs, and annual premium.

The noteworthy feature of this table is that the appearances as to relative profitability of large and small cases, and of health insurance coverages compared with life insurance coverages, differ according to the basis used to measure profitability. When formula asset value is related to annual premium, large cases look much less profitable than when formula asset value is related to formula acquisition cost. The 1,000-life medical care insurance risk, on which the formula asset value is the *lowest* percentage of annual premium among the 12 types of cases illustrated, has the *lowest* acquisition cost as a percentage of annual premium and the

TABLE A
COMPARISON OF MARGINS WITH PREMIUM AND ACQUISITION COSTS

COVERAGE	NUMBER OF LIVES	ANNUAL PREMIUM	FORMULA ACQUISITION COSTS*		FORMULA ASSET VALUE EQUALS PV OF MARGINS FOR 20 YEARS†			FIRST YEAR FORMULA MARGINS‡		
			Amount	% of (1)	Amount	% of (1)	% of (2)	Amount	% of (1)	% of (2)
		(1)	(2)	(2A)	(3)	(3A)	(3B)	(4)	(4A)	(4B)
Life.....	25	\$ 1,254	\$ 885	71%	\$ 1,936	154%	219%	\$ 243	19%	27%
	100	4,560	3,030	66	6,120	134	202	807	18	27
	300	12,859	4,426	34	11,382	88	257	1,609	13	36
	1000	41,040	6,661	16	14,507	35	218	2,576	6	39
Weekly Indemnity.	25	\$ 866	\$ 648	75%	\$ 654	76%	101%	\$ 58	7%	9%
	100	3,150	2,227	71	2,416	77	108	264	8	12
	300	9,167	3,712	40	5,366	59	145	894	10	24
	1000	29,295	6,426	22	11,874	41	185	2,225	8	35
Medical Care.....	25	\$ 2,472	\$ 1,877	76%	\$ 2,617	106%	139%	\$ 343	14	18%
	100	9,312	5,710	61	7,544	81	132	1,224	13	21
	300	27,072	5,101	19	12,155	45	238	2,519	9	49
	1000	84,480	7,030	8	23,561	28	335	5,530	7	79
Aggregate Life#.....		\$ 500,000	\$268,000	54%	\$581,000	116%	217%	\$ 77,000	16%	29%
Aggregate WI#.....		175,000	103,000	59%	118,000	67%	114%	14,000	8%	14%
Aggregate MC#.....		325,000	160,000	49%	238,000	73%	148%	38,000	12%	24%
All Coverages Combined#.....	25	\$ 300,000	\$219,000	73%	\$374,000	125%	171%	\$ 46,000	15%	21%
	100	350,000	229,000	65	374,000	107	163	51,000	15	22
	300	200,000	61,000	30	138,000	69	226	22,000	11	36
	1000	150,000	22,000	15	51,000	34	230	10,000	7	45
Grand Total#.....		\$1,000,000	\$531,000	53%	\$937,000	93%	176%	\$129,000	13%	24%

* Acquisition cost is the excess of commissions, taxes and expenses shown in columns (4) and (5) of Table 2 for policy year 1 over corresponding amount shown for policy year 10.

† Present value as shown in last column of Table 2, adjusted to remove acquisition costs from calculation of net current margin for first year.

‡ Computed from Table 2 as excess of column (1) over sum of columns (2), (3), (4) and (5), after adjusting columns (4) and (5) to remove acquisition costs.

Aggregates are based on distribution of new business illustrated in Table 3, applied to total new business annual premium of \$1,000,000.

highest ratio of asset value to acquisition cost, according to the assumptions on which Table A is based.

Note from Table A that the formula cost of acquiring \$1,000,000 of new business annual premium is about 53% of annual premium, and that the formula asset value of the business on the books is 93% of annual premium and 176% of formula acquisition costs. Note also that the rate of return on the acquisition cost investment is higher in the first years than in later years, but that the percentage of acquisition costs recovered in the first year is much greater for large cases.

Comparisons similar to Table A, preferably based on realistically projected acquisition costs and realistic computation of asset values, may thus form a valuable basis for management decision as to alternative product-mix objectives, and their achievement through concentration of sales effort, changes in sales compensation practices, or changes in premium rate or dividend scales.

A second area in which this split-office technique may be useful is in the evaluation of renewal premium rate scales and practices. Table B illustrates a comparison of two alternative approaches by which a company might seek to deal with the problem of rising claim levels on medical care coverage. For simplicity, the illustration is based on a model office composed entirely of 25-life medical care cases. The model office includes all such cases now in force, at all policy durations, but treats them all as if they were newly issued cases. In other words, all past history of acquisition costs or surplus margins may be ignored, since we are comparing only alternative future prospects.

The comparison illustrates alternative advantages of two proposed renewal rate Bases X and Y which might be applied to cases on which the loss ratio is so high that present premium rates develop no current margin. On Basis X, the premium rate is increased gradually over 3 years until sufficient to produce a current margin at the desired level (about 10% of current premium). On Basis Y, the rate is increased immediately to a level sufficient to produce a current margin at that level. On both bases, rates are increased 5% per year thereafter to keep pace with upward claim trends. On each basis it is assumed that experience and dividend practices after the 5th year will produce continuing margins equal to exactly 10% of current premium.

The projection assumes that the normal lapse rate of 10% for each year in which rates are increased 5% increases to 15% for each year in which the rate increase is 10% (on Basis X) and to 35% for the year when the rate increase is 20% (on Basis Y). It is the recognition of the impact of renewal rate action on the lapse rate which produces significance in the results projected.

Table B shows that Basis Y produces larger current margins over the first 3 years so that the surplus position on Basis Y will be over \$100,000 better after 5 years. On the other hand, the margins during the second 5-year period are enough higher on Basis X to reduce this gap by the end of the 10th year. This arises from the fact that the number of cases remaining in force at the end of the 5th year is about 15% lower on Basis Y

TABLE B
MODEL OFFICE PROJECTION FOR IN-FORCE GROUPS
MEDICAL CARE COVERAGE—25 LIVES

PERIOD OF YEARS	NUMBER OF GROUPS (1)	CURRENT YEAR RESULTS (IN \$1,000'S)				ASSET VALUE AT END OF PERIOD (6)	CURRENT "GAIN" (7)	PRESENT VALUE OF MARGINS FOR PERIOD (8)
		Premium (2)	Claims (3)	C+T+E (4)	Margins (5)			
Renewal Basis X								
1st.....	1,000	\$ 2,472	\$2,100	\$ 449	\$ -77	\$1,944	.....	\$ -75
2d.....	850	2,311	1,874	401	+36	2,003	\$ 95	+33
3d.....	722	2,160	1,671	359	130	1,971	98	115
4th.....	614	2,020	1,493	321	206	1,864	99	174
5th.....	553	1,910	1,412	299	199	1,762	97	160
5 Yr. Total....	(1,000)	\$10,873	\$8,550	\$1,829	\$ 494	\$1,762	.....	\$ 407
6th-10th.....	(498)	\$ 8,088	.....	.....	\$ 809	\$1,328	\$375	\$ 565
11th-15th.....	(294)	6,090	.....	.....	609	1,001	282	334
16th-20th.....	(174)	4,586	.....	.....	459	754	212	197
After 20th.....	(103)	\$13,980	.....	.....	\$1,398	0	\$644	\$ 284
Total.....	(1,000)	\$43,617	.....	.....	\$3,769	0	.....	\$1,787
Renewal Basis Y								
1st.....	1,000	\$ 2,472	\$2,100	\$ 449	\$- 77	\$1,850	.....	\$- 75
2d.....	650	1,928	1,433	316	+179	1,760	\$ 89	+166
3d.....	585	1,822	1,354	294	174	1,670	84	154
4th.....	526	1,720	1,279	274	167	1,582	79	141
5th.....	473	1,624	1,208	255	161	1,498	77	129
5 Yr. Total....	(1,000)	\$ 9,566	\$7,374	\$1,588	\$ 604	\$1,498	.....	\$ 515
6th-10th.....	(426)	\$ 6,918	.....	.....	\$ 692	\$1,136	\$330	\$ 483
11th-15th.....	(251)	5,209	.....	.....	521	856	241	286
16th-20th.....	(149)	3,923	.....	.....	392	645	181	169
After 20th.....	(88)	\$11,958	.....	.....	\$1,196	0	\$551	\$ 243
All.....	(1,000)	.....	.....	.....	\$3,405	0	.....	\$1,696

Notes and assumptions for Table B:

Col. (1): Lapse rate 15% at end of the first 3 years on Basis X, 35% at end of first year on Basis Y, 10% at end of each other year on both bases.

Col. (2): Premium per case \$2,472 for first year on both bases; increased 10% at end of first 3 years on Basis X, 20% at end of first year on Basis Y, 5% at end of each other year on both bases.

Col. (3): Claims per case \$2,100 for first year, increasing 5% per year.

Col. (4): Renewal commissions and taxes computed from scale in Table 1 plus renewal year expenses \$287 per case in first year, increasing 3% per year.

Col. (5): Col. (2) minus sum of Cols. (3) and (4) in first 5 years; 10% of premium for later years.

Col. (6): Equals present value as of end of period of margins shown in Col. (5) for all subsequent years.

(In effect this present value anticipates effects of premium changes and lapses shown in Cols. (1) and (2) for following years, and thus does not relate to present value of cases at premiums charged for the year just completed.)

Col. (7): Current margin plus increase in asset value.

Col. (8): Col. (8) discounted to inception date at 5% per year.

than on Basis X. The calculation of asset values on each basis at each duration shows that the potential margin-producing capacity of the original 1,000 cases is lower on Basis Y than on Basis X.

The comparison illustrates that a decision must be made as to whether immediate improvement in surplus, through increases in current margins, is more valuable than maximizing the asset value of the in-force business, which will result in greater improvement in surplus a decade later.

The final example extends the technique used for analysis of renewal rates to the more complex problem of considering alternative initial premium rate scales. The company which has selected a renewal policy for its in-force cases must also determine whether it wishes to continue issuing new business at its present premium rates. Table C illustrates an application of the technique to evaluate the interrelated problems of the

TABLE C
ILLUSTRATIVE MODEL OFFICE COMPARISONS FOR NEW BUSINESS

	INITIAL RATE BASIS	
	Basis Y	Basis Z
<i>Initial Assumptions</i>		
Initial Premium per Case.....	\$ 2,472	\$ 2,719
<i>Sales</i>		
—Number of Groups.....	1,000	600
—Initial Annual Premium.....	\$2,472,000	\$1,631,000
<i>Acquisition Costs</i>		
—Excess First Year Commissions.....	\$ 480,000	\$ 316,000
—Other Acquisition Expense.....	1,118,000	838,000
	\$1,598,000	\$1,154,000
<i>Renewal Assumptions</i>		
<i>Rate Increases</i>		
—At End of First Year.....	20%	9%
—Annually Thereafter.....	5%	5%
<i>Lapse Rate</i>		
—At End of First Year.....	35%	14%
—Annually Thereafter.....	10%	10%
Number of Groups Renewed in Second Year... (Experience as illustrated for Basis Y in Table B)	650	516
<i>Margin Projections</i>		
First Year Margin.....	\$- 77,000	\$+ 94,000
<i>Present Value of Future Margins</i>		
—At Start of Second Year.....	\$1,850,000	\$1,469,000
—At Issue.....	\$1,696,000	\$1,497,000
—Percentage of Acquisition Costs.....	106%	130%

effect of initial premium rate levels on anticipated sales volume, costs of acquisition on new business, anticipated persistency of new business, and anticipated margins on new business.

In Table C the assumptions related to the use of initial rate Basis Y include the assumption that these rates are competitively low enough to produce a higher volume of new business at relatively lower unit cost than that implicit in the dividend formula expense charges, which will be realized on Basis Z. The assumptions related to the use of initial rate Basis Z, on which initial premiums are 10% higher, recognize that a smaller premium rate increase will be required at the end of the first year to achieve the same renewal rate level as on Basis Y. This means that the lapse rate at the end of the first year will be lower on Basis Z. A comparison of the margin projections for Basis Y and Z shows that the asset value of business written on Basis Y will be only 6% greater than the acquisition cost for this business, while the asset value for business written on Basis Z will be about 30% greater than the acquisition cost. In other words, the lower unit acquisition expense on Basis Y will be more than offset by the difference in first year premium margins and the impact of the higher first year lapse rate on Basis Y.

These several illustrations of technique are intended to demonstrate only technique and not any evaluation of financial results of alternative management decisions which actuaries might make. The comments which I made previously as to importance of using realistic assumptions in order to obtain meaningful projections apply to these examples just as much as they apply to illustrations of technique included in the paper itself.

ARTHUR G. WEAVER:

Mr. Bartlett has presented an interesting application of asset share and model office techniques to group insurance planning. Certainly every company considering entry into the group insurance field will want to make similar calculations to determine the investment required and the pattern of its repayment.

To avoid voluminous calculations, Mr. Bartlett has assumed a satisfactory premium rate structure, a satisfactory group insurance dividend formula, incurred claim loss ratios which vary only by size of case, unit expenses which remain unchanged from year to year, a fixed "mix" of business by size and line, and the absence of individual case growth. Mr. Bartlett wisely warns that company management should not attach an unwarranted degree of accuracy to estimates so developed, since any one of these factors can have a material effect on the financial results. Actually with modern electronic data processing equipment it should be feasible

to construct elaborate model offices to test a wide range of possible variations in these factors. Such model offices would be even more valuable for management use.

In general, Mr. Bartlett's asset share assumptions appear realistic. He should be prepared, however, for somewhat less favorable claim loss ratios for group Accident and Health coverages. For example, 1,000 life cases are assumed to have incurred Accident and Health claim loss ratios slightly under 80%. Based on this assumption, his Table 2 experience projection develops a 2.1% excess of Accident and Health premiums over claims, expenses and dividends. This narrow margin for surplus will be completely eliminated if actual claim experience goes much higher than, say, 85%.

In Table 4, the author traces the emergence of surplus for a single year's issue. Starting with an earned premium of \$100,000, the original investment of \$40,822 is repaid by the end of the 6th policy year. Thereafter surplus generated each year fluctuates between 8% and 10% of annual premium remaining in force. At date of issue such a pattern of surplus should have a present value of about \$560 per \$1,000 premium production. This figure appears to be high in light of the many uncertainties surrounding group insurance.

The First Boston Corporation prepares annually an evaluation of life insurance company stocks. In computing stockholders' equity, it uses \$5.00 per \$1,000 insurance in force as the valuation factor for group life. This works out to about \$450 per \$1,000 group life premium in force. This organization allows very little, if any, credit, for group Accident and Health unless the line has consistently shown profits. Since Mr. Bartlett has assumed 50% of all premium is from group life, First Boston Corporation would appear to place a present value of about \$225 per \$1,000 group premium in force and presumably considerably less when measured against group premium production. Its valuation would be further reduced for any company writing a more normal proportion of group life business.

Mr. Bartlett's calculations lead him to conclude that surplus margins for large groups are relatively less than for small groups. Actually surplus margins are controllable, within limits, by claim, dividend formula and expense allocation assumptions. Mr. Bartlett does point to the effect of competition on surplus margins. In practice this may be the controlling factor.

Mr. Bartlett is gearing his operation primarily to handle smaller groups (65% of premium from 25-life and 100-life cases). John Hancock group business includes a much higher proportion of larger groups for which specialized, low-cost administrative techniques have been developed. We

wonder if the author has reflected fully the essentially higher cost of acquiring and administering the smaller group. In particular, can the average group field representative reasonably be expected to produce \$100,000 of new annual premium each year from smaller groups?

Mr. Bartlett also touches on the propriety of charging only direct group department expenses until the line of business is well established. In his model office this means the difference between a 5 to 6 million dollar loss and a small gain at the end of 10 years. In a mutual life insurance company the money would have to be advanced from funds belonging to other policyholders and should only be spent if justifiable as a good investment. This criterion suggests that the money should be repaid over a reasonable period of time or else that operational advantages be visualized which are worth at least this amount to the rest of the company.

Note that the company entering the group line is not only making a substantial investment over a long period of time. It is also pledging its "full faith and credit" to a line where heavy underwriting losses in a given year are not uncommon. These considerations suggest that company management should have available calculations showing a range of estimates for possible performance results rather than just the most probable results.

For companies already established in the group insurance field, alternative methods are available for projecting operating results. In particular, Mr. Pike's paper on "Gain and Loss Analysis for Group Insurance" describes a technique which has been used successfully by John Hancock in its long-range planning.

Under our group dividend formula, sources of gain, expressed as a percentage of premium, change gradually and therefore can be used with reasonable confidence to approximate the operating gain for the nearest calendar year. Operating gain for future years can also be projected by reflecting expected changes in each individual source of gain. However, here, as in Mr. Bartlett's calculations, results are necessarily based on assumptions regarding premium, claim and expense payments which may or may not prove realistic.

(AUTHOR'S REVIEW OF DISCUSSION)

DWIGHT K. BARTLETT, III:

I wish to thank Mr. Moran and Mr. Weaver for adding so greatly to the paper by their thorough discussions. The admonition of the Society to actuarial students that "the discussions of papers are an essential part of the reading and . . . should be studied as carefully as the papers themselves" certainly may be well taken here.

I fear that the paper has misled Mr. Weaver on one point. He has apparently interpreted the difference in the figures of Table 9, column (4) and Table 8, column (7) as representing the investment that the model office company has made in its group department. The intent was rather that a set of dividend formula expense factors set to meet competitive conditions will not reproduce the actual expenses of a group department. In the early years such formula expenses will be for less than actual expenses, while in a mature department such factors will not only cover direct expenses of the department but will also make a contribution towards the indirect items of overhead expenses. A measure of the value of the department to the company should include not only contribution to surplus but also towards these items of indirect expenses which would exist even without the department. Therefore Table 9, column (4) is intended to indicate the amount that the company will need to invest in the department and which the department should be expected to repay to the company after it has reached a reasonably mature level.

Mr. Moran shows in his discussion several extensions of the techniques of the paper to attack the specific problem of setting renewal rating practices and new business premium rate scales and in so doing greatly enhances the value of the paper.

Both Mr. Weaver and Mr. Moran dwell at some length on what they consider to be very inappropriate assumptions made in the preparation of the tables in the paper in view of present day business conditions. The author can only repeat the admonition of the paper that the assumptions were not intended to be appropriate for any particular company that might be using these techniques. As they point out, the most questionable assumption is the ratio of claims to premium in the Accident and Health asset shares. If an actuary of a company considering entry into this field feels that the industry will continue to tolerate present day claim ratios in group Accident and Health business, it is difficult for the author to see how he could possibly recommend entry into this field.