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**RETURN ON STOCKHOLDER
EQUITY—ACTUARIAL NOTE**

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ABSTRACT

If stock life insurance companies are to continue to be an attractive vehicle for stockholder investment, adequate recognition must be given to the importance of the basic economic concept of return on stockholder equity. Fiscal objectives should include the desired return on equity. The actuary's pricing philosophy must recognize not only the plan/age cell but also the total corporate objective of return on equity.

A display of earnings may be more meaningful to a board of directors when related to stockholder equity, since this relationship involves general economic and financial concepts to which the board members are exposed in their nonlife insurance businesses.

The Note explores certain basic concepts and defines such terms as stockholder equity, gain from insurance operations, and net interest earned on stockholder equity. The concepts are explored without discussing the technique of determining the adjustment to reported earnings to obtain adjusted earnings. To illustrate the basic concepts, it is assumed that there is no participating business and neither capital gains nor losses.

Since total corporate earnings and, thus, return on stockholder equity will in part depend on capital funds and, as shown in the Note, the relationship of capital funds to stockholder equity, the recognition by the actuary of the concept of return on stockholder equity can create a new dimension in pricing and fiscal planning and control.

The Note presents several interrelationships among return on stockholder equity, capital funds, premiums earned, and so on. It is shown that even dividend policy may be determined in part by the objective for return on stockholder equity.

Several significant ratios and numbers for a company are shown, from which several conclusions are drawn. The conclusions state that, in order to achieve a stated objective for return on stockholder equity, the unfavorable trends in the company can be offset totally or in part by one or more of the following:

1. Increase in price to recognize the change in forces which determine gains and, thus, return on stockholder equity.

2. Use of part of capital funds in subsidiary operations to achieve a higher return than is available in the company's investment portfolio.
3. Accelerated investment in new business at the higher price levels.
4. Reduction of stockholder equity by such means as purchase and cancellation of some of the company's outstanding stock, increased cash distribution to stockholders, and so forth.
5. Increase in interest yield by an aggressively creative investment policy.

INTRODUCTION

TRADITIONALLY stock life insurance companies have been considered somewhat unique in relation to other corporate enterprises. Perhaps this tradition has led to the fact that in the life insurance industry the basic economic and financial concept of return on stockholder equity has sometimes been ignored in establishing corporate objectives and in measuring performance. If, however, stock life insurance companies are to continue to be an attractive vehicle for stockholder investment, recognition must be given to the importance of the basic economic concept of return on stockholder equity. Such a recognition requires a definition of such terms as "return" and "stockholder equity." Reasonable objectives for the level of "return" must be established. What is important to the actuary, however, is the need to introduce these concepts into pricing philosophy.

This Actuarial Note is directed to an application of the concept of return on stockholder equity to a life insurance company and is intended to stimulate further thinking in this area to the extent that (1) the actuary can communicate more effectively with those who understand traditional financial and economic concepts but do not understand the actuarial concepts of life insurance and (2) the actuary can structure price to recognize the corporate "whole" as well as the plan/age cell "part."

Many life insurance companies are concerned with what appears, on the surface, to be an alarming decline in (a) the gain from "insurance operations," as contrasted with "investment operations," and (b) the ratio of gain from insurance operations to the total reported gain from operations.

A method sometimes used to determine the gain from insurance operations is to compute the excess of c over d , where c is the total reported gain from operations and d is the excess of net investment income over the interest required to maintain reserves. This method may let one fall prey to fallacious reasoning, or, if not fallacious, inconsistent reasoning. The method has certain weaknesses, among which are the following:

1. The use of earnings reported in the Convention Blank without adjustment for change in unamortized investment in new business. So-called adjusted earnings should be used to provide a reliable basis for revealing trends in the underlying earnings of the company. Reference to adjusted earnings will be made later.

2. The unrealistic assumption that "insurance operations" should receive credit for only that interest determined by multiplying the weighted reserve rate, which is unrelated to the actuary's assumption as to the interest rate to be earned on policy contract funds, by a reserve not necessarily related to those policy contract funds the actuary assumes will earn interest.

3. The assumption that interest earnings on policy contract funds in excess of that which was assumed would be earned are not a part of insurance operations. If such excess interest is not a part of insurance operations, should mortality and expense gains or losses similarly be considered not a part of insurance operations?

4. The presumption that a decline in gain from insurance operations, as a per cent of total earnings, does, per se, reveal unfavorable trends. Such a decline may reflect the accelerating investment in new business, or it may only indicate that the return on stockholder equity is declining, which decline may not be the result of a declining profit margin in the premium rate for any plan/age cell.

A display of earnings may become considerably more meaningful when the earnings are related to stockholder equity. When fiscal analyses are being presented to members of a board of directors, it is desirable that the analyses relate to general economic and financial concepts to which the board members are exposed in their other nonlife insurance businesses, concepts which are usually understood by the board members.

RETURN ON STOCKHOLDER EQUITY

In order to compute the return on stockholder equity for a life insurance company, it is first necessary to define several basic financial terms, as will be done under "Definitions and Formulas." This necessity arises because life insurance accounting practices do not conform to the accounting practices generally followed in other industries. Thus, a generally accepted meaning of return on stockholder equity¹ does not hold for the life insurance company.

Neither the gain from operations nor stockholder equity, as defined later, is available from the Convention Blank. This obvious practical deficiency in the formal, public, reporting document of the life insurance industry (the Convention Blank) has contributed, perhaps, to the so-

¹ Return on stockholder equity generally means the ratio of the gain from operations after federal income taxes, which gain is shown in the operating statement, to capital and surplus adjusted for preferred stock, which common stock book value is shown on the balance sheet.

phisticated investment analyst's reluctance to derive meaningful conclusions from the reported earnings. But the inherent weakness derived from this deficiency does not relate solely to the analyst. It has in many instances precluded management's actually determining a meaningful financial index, that is, return on stockholder equity. One may "play with the numbers," however, until he reaches the rather satisfying conclusion that there are certain significant, though concealed, relationships available which will provide management with some effective tools for fiscal control. These are revealed under "Relationships."

It may be necessary to postulate that in a stock company it is essential that management achieve a "reasonable" return on stockholder equity. This does not mean that the life company completely justifies its existence if it secures an adequate return; it does mean that unless the company achieves an adequate return it has not justified its corporate existence.

Actuaries have dedicated their mathematical aptitude diligently to sound pricing. In this process the price structure is usually developed independently of total corporate earnings, which are derived in part from earnings on capital funds. The discussion of Charles L. Trowbridge's paper "Theory of Surplus in a Mutual Company" at the meeting of the Society of Actuaries in the fall of 1967 indicated that, at least for a stock company, there may be a soundly conceived, theoretically determinable, limit of capital funds. Since total corporate earnings and, thus, return on stockholder equity will in part depend on capital funds and, as will be seen later, the relationship of capital funds to stockholder equity, the recognition by the actuary of the concept of return on stockholder equity can create a new dimension in pricing and fiscal planning and control.

To illustrate what will be discussed in elementary mathematical relationships later, consider a company which seeks a 15 per cent before-tax return on stockholder equity. If the actuary computes a price which will provide a 15 per cent return on capital funds invested to acquire new business, the return on stockholder equity will be 15 per cent only if the funds not so invested in acquiring new business are also earning 15 per cent. If such funds earn only 6 per cent, the return on the amount invested in new business must be increased beyond 15 per cent, or those funds not so invested in new business, the usual capital funds, must be eliminated! Therefore, if 15 per cent return on stockholder equity is a guideline, the relationship between the amount invested in new business and total capital funds cannot be ignored, since the return on the amount invested must be high enough that, when combined with the return on capital funds, the total desired return on stockholder equity is obtained.

Consider another example. Suppose the issue, underwriting, and sales expenses of a company were spread more nearly evenly during the first

ten policy years, producing thereby no investment of stockholder funds in the acquisition of the new business. The "return on investment" approach might suggest zero profit loading (a/c no investment), whereas the return on stockholder equity forces into the price structure a loading for profit. This may appear to be an absurd example. Actually, however, the author has been involved in a specific case where it was actually applicable. In such a case, the concept of profit's being determined solely as a return on investment in new business collapsed.

An acceptable premise for this Actuarial Note is that it is reasonable to assume that an adequate return on stockholder equity is one appropriate guideline for both pricing and fiscal planning. To deny the logic of this premise may create lack of confidence in the stock life company as a suitable vehicle for stockholder equity and may even deny that the whole is equal to the sum of its parts.

Definitions and Formulas

F_{n-1} = Capital funds at the end of year $n - 1$, i.e., at beginning of year n

= Excess of assets (line 31, p. 3, of the Convention Blank) over liabilities (line 26, p. 3)
+ Security valuation reserve.

S_{n-1} = Stockholder (common) equity at the end of year $n - 1$, i.e., at the beginning of year n

= F_{n-1}
+ Deficiency reserve
- Callable or redeemable value of preferred stock
+ Unamortized investment made in new business² with appropriate adjustment for tax and for maintenance of reserves on a consistent basis from year to year
- Deferred tax on policyowner surplus
- Deferred tax on unrealized gains.

i_n = Net rate of interest earned during year n .

$i_n S_{n-1}$ = Net interest during year n on stockholder equity at beginning of year.³

² These concepts can be explored without a discussion of the technique of determining this "adjustment," except to say that the adjustment is not the "increase in the value of the business on the books." This "adjustment" has been discussed before the Society of Actuaries and the Conference of Actuaries in Public Practice and will probably continue to be discussed until consensus emerges.

³ To illustrate the concepts, we will not complicate the relationship with the assumption, held valid by some, that interest on stockholder equity should be reduced by such purely stockholder expense as registrar and transfer agent expense, cost of stockholders' reports, stockholders' meetings, registration expense, and the like. The dis-

R_n = Reported gain from operations, before federal income tax (p. 4, line 32A, of the Convention Blank).⁴

G_n = Gain from insurance operations during year n , before federal income tax

= R_n

+ Increase in unamortized investment made in acquiring new business

+ Increase in deficiency reserves

- $i_n S_{n-1}$

- Dividends on preferred stock.

r_n = Return on stockholder equity during year n , before federal income tax

$$= \frac{G_n + i_n S_{n-1}}{S_{n-1}};$$

$$\therefore r_n S_{n-1} = G_n + i_n S_{n-1}.$$

P_n = Premiums earned in year n .

Z_n = Ratio of gain from insurance operations during year n to premiums earned during year n .

$$Z_n^5 = \frac{G_n}{P_n}, \text{ assuming } G_n \text{ is positive.}$$

Then

$$\frac{G_n}{S_{n-1}} = r_n - i_n$$

or

$$\frac{Z_n P_n}{S_{n-1}} = r_n - i_n \quad \text{or} \quad r_n = \frac{Z_n P_n}{S_{n-1}} + i_n.$$

Relationships

$$r_n = \frac{Z_n P_n}{S_{n-1}} + i_n;$$

$$r_{n+1} = \frac{Z_{n+1} P_{n+1}}{S_n} + i_{n+1}.$$

discussion will not pursue the elegant method of applying i_n to the average stockholder equity during the year, even though the theory would be applicable if average stockholder equity were to be used.

⁴ It will be convenient to assume that no participating business is written, eliminating for purposes of this discussion the problems raised by the restriction on stockholders' participating in profits on participating business, and that there are neither realized nor unrealized capital gains.

⁵ The ratio Z_n cannot properly be used to compare the operations of different life companies. It may be quite useful (subject to further analysis) as an indication of significant trends in the operation of a life company from year to year.

1. If i_n and Z_n remain constant from year to year, the return on stockholder equity, r_n , will remain constant only so long as $P_n/S_{n-1} = P_{n+1}/S_n = \dots$; that is, only if premium income increases at the same rate as stockholder equity. If, however, i_n increases from year to year, Z_n remaining constant, then $r_n = r_{n+1}$ only if $i_{n+1} - i_n = Z_n(P_n/S_{n-1} - P_{n+1}/S_n)$ or only if $P_n/S_{n-1} > P_{n+1}/S_n$; that is, only if the ratio of premium earned to stockholder equity is decreasing at a stated rate of $(i_{n+1} - i_n)/Z_n$ will $r_n = r_{n+1}$.

2. If the objective is to keep r_n constant or even to increase r_n , it can be achieved, even though $Z_n P_n/S_{n-1}$ is declining if i_n increases by an amount equal to or greater than the decline in $Z_n P_n/S_{n-1}$.

3. If r_n is less than the stated objective, and assuming F_{n-1} is of sufficient size to permit a reduction in capital funds, part of F_{n-1} could be used in several ways, the amount of which will vary depending upon whether used:

a) To invest in additional new business (it is assumed that the additional investment will permit the equation

$$G_{n+1} = (r_{n+1} - i_{n+1})S_n,$$

that is, the gain from insurance operations before federal income tax will continue to equal $(r_{n+1} - i_{n+1})S_n$, since the investment of capital funds in additional new business obtains new business at a price level which will permit the continuance of the desired return on stockholder equity);

b) For distribution to stockholders; or

c) To invest in a subsidiary operation which will yield the stated objective, which investment would reduce F_{n-1} only if the admitted value of such investment were less than the portion of F_{n-1} so invested (it is assumed that any investment in a subsidiary would at least earn the stated objective; if it were to earn more than i_n , but less than the stated objective, either Z_n or P_n must be modified to retain r_n at its stated objective).

4. Assuming that capital funds F_{n-1} are increased by an amount A , where A may represent either an infusion of new capital or additional retained earnings, we now have $G'_n + i_n(S_{n-1} + A) = r_n(S_{n-1} + A)$. If r_n after the addition of A is to be equal to r_n before the addition of A , we have

$$\frac{G'_n}{S_{n-1} + A} = r_n - i_n = \frac{G_n}{S_{n-1}}$$

or

$$\frac{G'_n}{G_n} = \frac{S_{n-1} + A}{S_{n-1}}$$

which is to say, if, at the beginning of any year, capital funds are increased by the addition of any amount, A , the gain from insurance operations must increase in the same ratio as the increase in stockholder equity. Reduced to its simplest form, it is obvious that, if i_n remains constant and S_{n-1} is increased by total retained earnings of x per cent of S_{n-1} , then the gain from insurance operations the following year must increase by x per cent, if r_n is to remain constant. Thus, cash dividend policy should in part be determined by the objective for return on stockholder equity.

5. If stockholder equity, S_n , and premiums earned, P_n , are increasing each year and if r_n is to remain constant and if i_n is constant, then G_n must increase each year or $Z_n P_n$ must increase. $Z_n P_n$ will increase if Z_n does not decrease or Z_n decreases by a ratio less than P_{n+1}/P_n .

Consider again

$$r_n S_{n-1} = G_n + i_n S_{n-1};$$

$$r_n = \frac{G_n + i_n S_{n-1}}{S_{n-1}}.$$

Let us assume that the corporate objective is to retain r_n as a constant, recalling that $r_n S_{n-1} = G_n + i_n S_{n-1}$. Then

$$r_n = \frac{G_n + i_n S_{n-1}}{S_{n-1}} = \left(\frac{G_n}{P_n} + \frac{i_n S_{n-1}}{P_n} \right) \frac{P_n}{S_{n-1}}$$

or

$$r_n = \left(Z_n + \frac{i_n S_{n-1}}{P_n} \right) \frac{P_n}{S_{n-1}}.$$

Thus, if the gain from insurance operations as a per cent of premiums, Z_n , is decreasing, the premium income as a per cent of stockholder equity must increase if r_n is to remain constant. If the gain from insurance operations as a per cent of premiums is increasing, premium income as a per cent of stockholder equity must decrease.

A Case History

It will be enlightening to relate some of the concepts illustrated above to the actual experience of a stock company. The period 1963-67 was used because it was essentially free of items that significantly affected the change in capital funds other than reported gain, federal income tax, and cash dividends to stockholders.

The commonly used method referred to in the Introduction was employed to compute the company's gain from insurance and investment operations, and the results were compared with the adjusted gains from operations, G_n , computed as defined above. Table 1 presents the comparison.

It was the apparent decline in gain from insurance operations, as computed by the commonly used method, which caused the company some concern. The computed gain, G_n , presents an entirely different picture from that determined by the commonly used method. Neither of the two gains from operations, however, becomes totally meaningful until it is related to stockholder equity, expressed as a rate of return on that stockholder equity.

For the company illustrated in the case history, several amounts and ratios were determined and are included in Table 2. All the column symbols have been defined, except r'_n , r''_n , and Z'_n , which will be defined below.

TABLE 1
GAIN FROM OPERATIONS BEFORE FEDERAL INCOME TAX
(\$000's Omitted)

n YEAR	METHOD REFERRED TO IN INTRODUCTION			RETURN ON STOCKHOLDER EQUITY METHOD		
	Total	Insurance	Investment	Total $G_n + i_n S_{n-1}$	Insurance G_n	Investment $i_n S_{n-1}$
1963.....	\$4,231	\$1,486	\$2,745	\$4,206	\$3,040	\$1,166
1964.....	4,026	1,294	2,732	4,060	2,837	1,223
1965.....	5,000	1,517	3,483	4,937	3,541	1,396
1966.....	4,906	929	3,977	4,920	3,390	1,530
1967.....	4,767	449	4,318	4,929	3,297	1,632

The company's gain from operations before federal income tax, R_n , remained almost constant during the three years 1965-67, in spite of an increase in the net rate of interest earned, i_n , from 4.4 to 4.6 per cent, which increase alone would have produced more than \$300,000 of additional income in 1967 on the assets at the end of 1966.

The return on stockholder equity, r_n , declined during the last two years. The arithmetic average of r_n during the five years was 14.6 per cent. The after-tax return on stockholder equity (not shown in Table 2) averaged 7.6 per cent.

If stockholder equity, S_n , at the end of each year had been only 75 per cent of the actual figures, the return would have been equal to r'_n . If 25 per cent of stockholder equity had been invested in a subsidiary, and so forth, yielding a return of 15 per cent, the return would have been r''_n . If there had been no change in stockholder equity, and Z_n for each year had been equal to Z'_n , the return on stockholder equity each year would have increased from r_n to 20 per cent.

If Z_n decreased (as it did) and there had been no increase in i_n , r_n would have decreased more rapidly than shown. If Z_n and i_n had remained constant, r_n would have remained constant only so long as P_n/S_{n-1} remained constant. Since for the company P_n/S_{n-1} decreased, one should expect r_n to decline. If i_n increases and if Z_n had remained constant, r_n would have equaled r_{n+1} only if P_n/S_{n-1} increased, which it did not.

TABLE 2
CERTAIN RETURNS AND RELATIONSHIPS
(\$000's Omitted)

n	R_n	$G_n + i_n S_{n-1} = r_n S_{n-1}$	S_n	F_n	P_n	G_n	$i_n S_{n-1}$	r_n	i_n
1963...	\$4,231	\$4,206	\$29,833	\$30,925	\$21,018	\$3,040	\$1,166	15.2%	4.2%
1964...	4,026	4,060	31,716	33,349	21,578	2,837	1,223	13.6	4.1
1965...	5,000	4,937	33,994	36,369	22,259	3,541	1,396	15.6	4.4
1966...	4,906	4,920	35,488	38,142	22,732	3,390	1,530	14.5	4.5
1967...	4,767	4,929	38,183	41,234	23,554	3,297	1,632	13.9	4.6

n	$G_n / S_{n-1} = r_n - i_n$	$G_n / P_n = Z_n$	$i_n S_{n-1} / P_n$	P_n / S_{n-1}	$S_n / S_{n-1} - 1$	$P_n / P_{n-1} - 1$	r'_n	r''_n	Z'_n
1963...	11.0%	14.5%	5.5%	75.9%	6.7%	0.9%	18.9%	17.9%	20.8%
1964...	9.5	13.1	5.7	72.3	6.3	2.7	16.8	16.3	22.0
1965...	11.2	15.9	6.3	70.2	7.2	3.2	19.3	18.3	22.2
1966...	10.0	14.9	6.7	66.9	4.4	2.1	17.8	17.1	23.2
1967...	9.3	14.0	6.9	66.4	7.6	3.6	17.0	16.5	23.2

In summary, a critical review of Table 2 reveals several unfavorable trends in the company's operations:

1. P_n/S_{n-1} was decreasing. This meant that in order to retain a constant r_n , assuming Z_n to be constant, i_{n-1} must equal $Z_{n-1}(P_{n-1}/S_{n-2} - P_n/S_{n-1})$, or its equivalent $(G_{n-1}/S_{n-2} - G_n/S_{n-1})$.
2. Z_n was decreasing, which compounded the problem of maintaining a constant r_n .
3. G_n/S_{n-1} was decreasing.

If, during 1963-67, i_n had remained at the level assumed in the company's rate structure, say, 3.70 per cent, assuming no other changes, the adjusted gain from operations before and after the assumed change in interest rate would have been as shown in Table 3, assuming no change in capital funds a/c of change in interest rate.

Table 3 displays dramatically the impact on earnings of increasing

interest earnings. If mortality had been unfavorable or expenses had increased, $G_n + i_n S_{n-1}$ and, thus, r_n , would have been further reduced.

An analysis of the concepts and relationships suggests that there are forces at work which require positive and vigorous action by the company management. In the final analysis, the real difficulty may lie in the fact that the return on stockholder equity is declining. Recognition of the problem leads, perhaps, to more than just one of the classic solutions, that is, increasing price. If interest rates decline, mortality experience becomes less favorable, or expenses increase, the gains and return will

TABLE 3
GAINS FROM OPERATIONS BEFORE TAX
(\$000's Omitted)

YEAR	GAIN RESULTING FROM:		
	Actual Interest	Assumed 3.70 Per Cent Interest	Per Cent Decrease
1963	\$4,206	\$3,333	21%
1964	4,060	3,331	18
1965	4,937	3,600	27
1966	4,920	3,208	35
1967	4,929	2,973	39

decline. In order to retain r_n at its stated objective, such unfavorable trends may be offset totally or in part by one or more of the following:

1. Increase in price to recognize the change in forces which determine gains and, thus, return on stockholder equity.
2. Use of part of capital funds in subsidiary operations to achieve a higher return than is available in the company's investment portfolio.
3. Accelerated investment in acquisition of new business at the higher price levels.
4. Reduction of stockholder equity by such means as purchase and cancellation of some of the company's outstanding stock, increased cash distribution to stockholders, and so forth.
5. Increase in interest yield by an aggressively creative investment policy.

CONCLUSION

Within the scope of the discussion it is obvious that the economic concept of return on stockholder equity is dependent upon the interrelationships of gain from insurance operations, return on investment in new business, rate of growth of stockholder equity, gain from operations, premium income, and so on.

The basic economic concept of return on stockholder equity is an essential element of pricing. It is not sufficient to look at the plan/age cell, which is, after all, only a part of the whole. Actuaries recognize that structuring the product price without looking at the whole can create practical problems, not the least of which is pricing of the product at a level too low to satisfy the basic corporate objective of an acceptable return on stockholder equity.

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