

TOTAL EARNINGS FROM INSURANCE OPERATIONS — THE INVESTOR'S VIEWPOINT

RUSSELL P. GODDARD

Although investments normally contribute the major portion of the total earnings of a fire and casualty insurance company, in our *Proceedings* there have been only two papers on investments submitted by members, the first by B. D. Flynn¹ in 1927 and the second by R. A. Bailey² forty years later. Each of these papers dealt with that part of investment earnings which is derived from premiums; in other words these papers looked at investment earnings from the buyer's viewpoint. A guest paper in 1965 by S. Davidson Herron, Jr.³ discussed investments from the viewpoint of the investment officer of an insurance company.

This paper breaks new ground, therefore, to the extent that it is the first one in the *Proceedings* to discuss the entire earnings of an insurance company and the interrelationship of the various sources of income, but it should not be considered in any sense original. It represents, rather, a synthesis of ideas which have been extant for a number of years, but which, to our knowledge, have never been assembled in quite the same way before. In particular, we shall draw heavily from the 1947 study made by Roy C. McCullough⁴ when he was connected with the New York Insurance Department. Here again, Mr. McCullough's study was directed primarily at investment earnings derived from premiums, but an important contribution of his work was the implied formula which he developed showing the relationship of underwriting and investment results to the total earnings.

The three principal sources of income of a fire and casualty company, as they appear in the annual statement, are:

1. Interest, dividends, and rents earned, less all investment expenses.
2. Profit or loss on sale, plus gain or loss from change in difference between book and market values.

¹ B. D. Flynn, "Interest Earnings as a Factor in Casualty Insurance Rate Making," *PCAS* Vol. XIV, p. 285.

² R. A. Bailey, "Underwriting Profit from Investments," *PCAS* Vol. LIV, p. 1.

³ S. Davidson Herron, Jr., "Insurance Company Investments," *PCAS* Vol. LII, p. 238.

⁴ Roy C. McCullough, "Report of Special Sub-Committee on Underwriting Profit," *Proceedings of the N.A.I.C.*, Seventy-Ninth Session 1948, pp. 74-157.

3. Underwriting gain or loss, i.e., difference between earned premiums and sum of incurred losses and incurred expenses.

The rate of return on the investment in a company is usually expressed as:

$$\frac{\text{Total gain from investments and underwriting}}{\text{Capital and surplus}} \quad (1)$$

This ratio somewhat overstates the rate of return because the amount actually contributed by investors is always somewhat greater than the nominal capital and surplus shown in the balance sheet, except when the company is brand new. As soon as the first policies are written, the surplus is reduced by the initial operating expenses (primarily commissions) which cannot be deducted from premiums since the entire amount of each premium written must initially be set aside as an unearned premium reserve. This amount is usually called the "equity in the unearned premium reserve," but Mr. McCullough preferred the more general term "prepaid expenses," which is probably less likely to be misunderstood. The word "prepaid" is not completely descriptive, since only certain expenses are paid before the policies are written, while others are paid at the time the policies are written. The exact terminology is not important as long as the nature of the transaction is understood. The rate of return can therefore be expressed as:

$$\frac{\text{Total gain from investments and underwriting}}{\text{Sum of capital, surplus, and prepaid expenses}} \quad (2)$$

For a relatively new company, the denominator in the above represents the actual amount invested in the company. For an older company, it represents the amount put in originally plus the accumulated profits left in. In the case of a mutual company, it represents the investment of policyholders in their capacity as owners of the company.

The investments of a fire and casualty company are derived either from the amounts contributed by the stockholders (i.e., capital and surplus) or from premiums which are available for investment while in the possession of the company, and before being paid out as losses, expenses, or dividends. Since the entire amount of premiums is never available for investment at any one time, one device for representing this fact in a formula is to assume

that the premiums are invested at a lower rate of interest than capital and surplus. Such a formula might take the following form:

$$\text{Investor's rate} = \frac{Ci + Pj + PU}{C + pe} \quad (3)$$

Where C = Capital and surplus

P = Premiums

pe = Prepaid expenses

i = Full interest rate on capital and surplus

j = Reduced interest rate on premiums

U = Underwriting profit

A formula such as the above could be derived from tables XXI to XXIII prepared by Mr. McCullough, with slight changes in terminology. He used rates of interest from 2.75% to 3.5% for i and from 2.0% to 4.0% for j . He allowed P to range from 40% to 65% of $(C + pe)$, based on actual company operations through 1945, but indicated that this ratio could go much higher.

The use of a lower interest rate as applicable to premiums is an unsatisfactory device because it does not represent the true nature of the transaction, which is that the entire amount of premiums for a given line of insurance is not available for investment at any one time, although, once invested, it may remain invested for longer than one year.

The phrase in most common use to designate the relationship between one year's premium and the total time it is available for investment is Equivalent Period. This may be represented in a formula by the symbol Q (rather than EP , which might look like Earned Premiums) and may be so defined that $Qi = j$. This enables us to rewrite formula (3) in a more flexible form as

$$\text{Investor's rate} = \frac{Ci + PQi + PU}{C + pe} \quad (4)$$

Where: Q = Equivalent Period

and other symbols are as in formula (3)

A variation of the above formula might substitute i' for the second i , if it is assumed that capital and surplus may be invested more speculatively than the assets derived from premiums. Such a substitution may be necessary, in order to handle the sometimes troublesome item of capital gains.

With a formula similar to (4) established, it is possible to discuss the various items individually.

The investment possibilities for a fire and casualty company are essentially the same as those for a mutual fund, and somewhat greater than those for a life insurance company. The Institute of Life Insurance annually publishes what it calls the "Interest Rate" earned by life insurance companies. No comparable single figure is regularly available for fire and casualty companies, although the result may be approximated from the data in Best's Aggregates and Averages. In spite of the differences in accounting methods, and in the range of investment possibilities, the results for the two types of companies are set forth below to satisfy a natural curiosity as to their relative success in the investment market.

Calendar Year	Life Companies (a)	Stock Fire and Casualty Companies (b)
1956	3.63%	3.8%
1957	3.75	- 1.1
1958	3.85	12.1
1959	3.96	5.5
1960	4.11	3.4
1961	4.22	11.6
1962	4.34	- 1.1
1963	4.45	8.5
1964	4.53	7.1
1965	4.61	5.5
1966	4.73	- 2.1
Average	4.20%	4.8%

- (a) Ratio of net investment gain to mean invested assets (including cash) less half the investment gain. The average for the 11 year period is the arithmetic average of the Individual years.

Source — Institute of Life Insurance

- (b) Ratio of net investment gain to 85% of total assets.

Source — Basic data from Best's Aggregate and Averages.

For the ten year period ending in 1966, fire and casualty companies earned 4.9% on their invested assets, and for the ten years ending with 1965, the rate was 5.7%.

Fire and casualty companies normally receive a greater return on their investments than life companies, in spite of the occasional losses, which are part of the risk which anybody takes by investing in common stocks. It is interesting to compare the distribution of assets for the two types of companies.

	Life Companies (a)	Fire and Casualty Cos. (b)
Total bonds	43.1%	46.0%
Total stocks	5.2	38.0
Mortgages	38.7	0.2
Real estate	2.9	1.4
Policy loans and premium notes	5.5	0
Uncollected premiums	*	7.5
Cash	0.9	3.1
All other	3.7	3.8
Grand Total	100.0%	100.0%

(a) Best's Life Insurance Reports, as of Dec. 31, 1966

(b) Best's Aggregates and Averages as of Dec. 31, 1966

* Not listed separately

Although fire and casualty companies earn more on their investments than life companies, the latter make a more detailed analysis of their return by type of investment. For a typical well-established company, the following rates of earnings are shown:

Bonds	4.30%
Stocks	3.57
Mortgages — Gross	5.55
Net	5.22
Real Estate — Gross	14.27
Net	5.48

The relatively high yield on mortgages, and their popularity with life insurance companies, leads to a natural question as to the reluctance of fire and casualty companies to invest in them. Only one group of 28 acci-

dent and health companies was found with more than 5% of their total assets in mortgages.

In any event, it appears that the average return from investments which may be expected by fire and casualty companies is approximately 5.0%. This includes capital gains, since it is evident that the heavy investment by these companies in common stocks has been made in anticipation of capital gains. Even if this were not true, it would still be necessary to include capital gains in this calculation, since we are here concerned with the total return to the insurance investor.

Equivalent Period.

The "equivalent period" for the purposes of this study may be defined as the proportion of premium available for investment times the period it remains invested. Although he did not use the term, Mr. Flynn gave a simple illustration of the meaning of equivalent period in his calculation of the interest earned on the premium for automobile collision insurance by assuming that the premium would be fully paid, less commissions, two months after inception of the policy, and that losses and other expenses, actually paid throughout the life of the policy, could be assumed to be paid in one lump sum six months after inception. Since Mr. Flynn arrived at interest earnings for this line of insurance of 1.0% based on an interest rate of 3.5%, it is assumed that the complete details of the calculation would be:

<u>Proportion Available For Investment</u>	<u>Period (Fraction of Year)</u>	<u>Interest Rate</u>	<u>Interest Earned on Total Premium</u>
.85	.333	3.5%	1.0%

In this case, the equivalent period would be the product of the first two items, or .28.

For other lines, such as workmen's compensation or automobile liability, where the payment of claims and claim expenses may extend over a period of many years, the principles are the same, but the actual calculations are much more tedious.

For a typical company the proportions of the total losses and loss

expenses paid in each year after policy inception are shown below for these two lines:

Year	Workmen's Compensation		Auto Liability	
	Per Cent Paid in Year	Period Held	Per Cent Paid in Year	Period Held
1	41.1	0.5	28.7	0.5
2	22.9	1.5	22.8	1.5
3	14.9	2.5	18.2	2.5
4	6.4	3.5	11.2	3.5
5	3.6	4.5	6.9	4.5
6	2.4	5.5	5.0	5.5
7	1.5	6.5	3.2	6.5
8	1.5	7.5	2.5	7.5
9	1.4	8.5	1.4	8.5
10	1.3	9.5	0.1	9.5
11	1.2	10.5		
12	1.0	11.5		
13	0.8	12.5		
Total	100.0	(2.25)	100.0	(2.44)

This distribution of payments applies only to losses and loss expenses which, for this company, amount to roughly 72% of the premium. The remaining 28% of the premium will be paid out in expenses during a period of 13 or 14 months after policy inception and may be assumed to be available for investment for approximately half a year. The composite product $(.28 \times 0.5 + .72 \times 2.25)$ gives an equivalent period for workmen's compensation of 1.75 years and a similar calculation produces an equivalent period for automobile liability of 1.90 years.

These calculations assume that all premium is paid in full at the inception of the policy. This assumption does not apply universally to workmen's compensation where the larger policies are subject to periodic audit, and the additional load incorporated in the deposit premiums may or may not offset the underestimates of advance premiums or the delays in audits.

It should be stressed that the estimates of equivalent periods given here are supplied only as evidence of technique and not as models or country-

wide averages. For workmen's compensation particularly, the equivalent period will obviously vary from state to state, depending on the proportion of long-term cases, and from company to company, depending, among other things, on the proportion of business subject to periodic audit. Some companies estimate the equivalent period for their workmen's compensation portfolio at approximately two years.

The method outlined above of determining equivalent period has the advantage of being unaffected by changes in premium volume. The average equivalent period for all lines of business written by a company can also be approximated from the annual statement, by deducting capital and surplus from total invested assets, and dividing the remainder by earned premiums. The figure so obtained is almost meaningless in itself, being a conglomerate average of all lines, and not recognizing that investments derived from premiums have been built up over a period of years when the premium was probably lower than it now is. It is a useful device, however, in that it enables us to avoid the fiction that investments derived from premiums must necessarily earn a different rate of interest from other assets.

In the eleven year period 1956-1966 the average equivalent period for all stock fire and casualty companies listed in Best's Aggregates and Averages has ranged from .94 years to .99 years, as shown in Exhibit II. The consistency of this average during a period of rapid growth is surprising. In the more stable period 1936-1945 the values ranged from .67 to .98 with an average of .83, as shown in Tables VIII, X, and II of Mr. McCullough's study, which covered all lines written by fire insurance companies entered in New York, exclusive of U.S. Branches. During that period the invested assets other than capital and surplus increased fairly steadily from year to year, but the growth in earned premiums was far from consistent.

Prepaid Expenses.

As previously explained, the inclusion of prepaid expenses with capital and surplus as the base to which gross earnings should be related is in recognition of the fact that the nominal capital and surplus does not represent the full investment of stockholders. How much this excess investment actually is must be a matter of approximation, and we have followed the lead of Mr. McCullough in applying the ratio of commissions and taxes to unearned premiums to obtain a reasonably satisfactory answer. During the period under review, commissions and taxes dropped from 23.6% to 21.1% while other expenses decreased from 13.1% to 10.8%.

Gain from Operations: 1957-1966

During the ten-year period ending with 1966, investors in stock fire and casualty companies earned an average return of 7.7%. This return can be analyzed in accordance with formula (4) as:

Numerator	$C = 107,330,624$
(000 omitted)	$P = 110,798,181$
	$i = .049$
	$Q = .99$
	$U = -.010$
Combined	9,447,673
Denominator	$C = 107,330,624$
(000 omitted)	$pe = \underline{14,925,000}$
	122,255,624

The result may also be written as follows:

$$\frac{C_i \quad PQ_i \quad PU}{C + pe} = 7.7\%$$

$$\frac{5,246,284 + 5,374,820 - 1,173,431}{122,255,624} = 7.7\%$$

This particular decade was an unfavorable one from an investment viewpoint, since it includes three of the four years since 1945 when the decrease in market values was great enough to offset interest earnings and produce a net loss from investments. For the ten year period ending with 1965, which included only two years with a net investment loss, the total earnings ratio was 8.9%.

In order to provide a historical background, the raw data from Mr. McCullough's report for the years 1936-1945 were extracted and placed on a basis comparable to that used here. Mr. McCullough made a different use of the data, since he did not include capital gains as part of investment income, and modified the statutory underwriting profit.

	Total Gain from Operations (000 Omitted)			
	1936-45* All Lines	1936-45* Fire Only	1956-65** All Lines	1957-66** All Lines
Total investment income	\$ 1,109,102	\$ 668,373	\$ 11,753,504	\$ 10,621,105
Statutory underwriting profit	109,012	120,780	-1,411,699	-1,173,431
Total gain from operations	\$ 1,218,114	\$ 789,153	\$ 10,341,805	\$ 9,447,673
C&S plus prepaid expense	\$15,272,940	\$8,745,054	\$116,692,675	\$122,255,624
Ratio %	8.0%	9.0%	8.9%	7.7%
Earned premiums	7,729,941	4,187,188	103,971,456	110,798,181
Underwriting profit ratio	1.4%	2.8%	-1.4%	-1.0%

*All fire insurance companies licensed in New York, exclusive of U.S. Branches. Data from McCullough report.

**Best's Aggregates and Averages.

In the years 1936-1945, the fire insurance companies restricted their writings to about half of their policyholders' surplus, and therefore had less money to invest. Even with favorable underwriting results, their total gain from operations was no greater than that made by all companies, fire and casualty, twenty years later. It was after 1945 that premiums started their upward climb and in the process the traditional two-for-one relation between surplus and premium has been forgotten. The industry as a whole has now reached a one-for-one point, with many individual companies allowing their writings to reach two or three times their policyholders' surplus. The mutual companies as a group now have an annual premium volume almost exactly twice their policyholders' surplus.

The present situation was anticipated, if not actually predicted, by Mr. McCullough in 1947 when he said (page 114), "Should the time come in the fire insurance business when a dollar of capital might be expected to generate a dollar of earned premium (that is, the ratio of annual earned premiums to risk capital should be 1/1) and should interest rates rise to 3.5%, it would be sufficient if the profit allowance in the rate structure were 1.75% to return 8% on capital." (For those who wish to check the arithmetic, it seems evident that a ratio of 2.75% was assumed on invested premiums, since $3.5 + 2.75 + 1.75 = 8.00$.)

Twenty years later, Mr. Mayerson, in his review of Mr. Bailey's paper,⁵ mentioned the possibility that premiums might be two or three times the capital and surplus, in which case the profit from premiums alone (i.e., excluding earnings on the stockholder equity itself) would be either 14% or 21% of the stockholder equity. These returns were predicated on an underwriting profit of 5%, embodied in the rates and actually earned, and 2% on invested premiums. While the total returns of 14% or 21% seem entirely within the realm of reason, it seems more realistic to assume that the earnings ratios would be reversed, and that there would be as much as 5% interest earned on invested premiums, with a maximum of 2% of statutory underwriting profit, regardless of how much was incorporated in the rates.

It is doubtful if any group of insurance commissioners could force the insurance companies as a whole to earn the full profit allowance included in the rates, especially in view of the possibility of lower federal income taxes on investment income, as explained in Mr. Herron's paper. Any effort to maximize the net return to investors would have to take into account the varying impact of federal income taxes.

Measurements of Financial Health.

The fire and casualty industry, with total premium income of \$22 billion from all types of carriers, is about 10% larger than the life insurance business in point of premium volume. Through the medium of automobile and homeowners policies, it probably reaches a larger number of people than life insurance, which derives a certain proportion of its premium from large policyholders who buy life insurance as an investment. It accounts for 3.0% of the gross national product, up from a low of 1.5% in 1945. With these indicators in the background, it must be confusing to investors to read

⁵ Allen L. Mayerson, discussion of Bailey, *op. cit.*, PCAS Vol. LIV, p. 20.

that the industry as a whole is a "distressed area in the American economic scene," or that it is "underearning."

The plight of the insurance investor was neatly phrased by Mr. Herron when he said, "For the insurance security analyst, there are often two separate companies under one corporate roof — the insurance company and the investment company. (The stockholder cannot enjoy this sophistication. For him there is only one.)" Investors need some means of distinguishing between reputable companies with different philosophies of management. Company A, for example, earns 4% on its investments and 2% on its underwriting, and confines its premium volume to one-half of its policyholders' surplus. Company B, on the other hand, earns 5% on its investments and loses 1% from underwriting, but has a premium volume twice as large as its surplus. Assuming an equivalent period of one year in each case, and disregarding the effect of prepaid expenses, Company A would be earning 7% for its investors and Company B 13% as measured by formula (4). Under another method of analysis, that of relating total earnings from underwriting and investments to total investable funds, Company A would earn 4.6% and Company B 4.3%.* Which method do actuaries prefer?

In conclusion, it is confidently expected that the trend toward more open competition in pricing will encourage actuaries to delve further into this fascinating subject. As Mr. Flynn said 40 years ago, "Throughout the discussions there has been a considerable amount of vagueness and confusion." When the time comes to translate the present vague knowledge into concrete figures which will create the maximum profit from the total operations of a company, the actuaries will have a field day.

* Company A: $.07/(1 + .5)$; Company B: $.13/(1 + 2)$.

TOTAL EARNINGS

STOCK FIRE AND CASUALTY COMPANIES
DATA FROM
BEST'S AGGREGATES AND AVERAGES
BASED ON ALL ANNUAL STATEMENTS AVAILABLE
(000 omitted)

Exhibit I

Calendar Year	No. of Companies	Premiums Earned	Interest Dividends and Rents	Profit From Sales and Appreciation	Total Investment Gain	Statutory Underwriting Profit	Gain From Operations
	(1)	(2)	(3)	(4)	(3) + (4)	(6)	(5) + (6)
1957	752	8,336,278	460,999	-627,341	-166,342	-361,289	-527,631
1958	733	8,840,975	488,897	1,585,265	2,074,163	-92,731	1,981,432
1959	748	9,527,075	534,478	486,167	1,020,646	+70,865	1,091,511
1960	767	10,266,166	592,392	63,019	655,412	+65,614	721,026
1961	791	10,709,883	620,612	1,895,093	2,515,706	+29,773	2,545,479
1962	809	11,277,728	673,401	-903,834	-230,432	+2,500	-227,932
1963	808	11,595,124	720,635	1,296,497	2,017,133	-218,657	1,798,476
1964	804	12,355,846	782,167	1,038,791	1,820,959	-347,516	1,473,443
1965	805	13,306,931	852,040	614,317	1,466,357	-424,506	1,041,851
1966	792	14,582,172	895,859	-1,448,358	-552,499	+102,517	-449,982
1957-66		110,798,181	6,621,484	3,999,620	10,621,105	-1,173,431	9,447,673

Calendar Year	Policyholders' Surplus	Estimated Prepaid Expenses	Capital and Surplus Plus Prepaid Expenses	Mean of Column (10)	Gain from Operations Ratio to Capital *
	(8)	(9)	(10)	(11)	(7) + (11)
1956	7,800,262	1,279,000	9,079,262		
1957	7,073,013	1,340,000	8,413,013	8,746,138	-6.0%
1958	8,619,370	1,377,000	9,996,370	9,204,692	21.5%
1959	9,381,140	1,459,000	10,840,140	10,418,255	10.5%
1960	9,494,889	1,499,000	10,993,889	10,917,015	6.6%
1961	11,719,406	1,496,000	13,215,406	12,104,648	21.0%
1962	11,146,292	1,467,000	12,613,292	12,914,349	-1.8%
1963	12,642,213	1,510,000	14,152,213	13,382,753	13.4%
1964	13,690,544	1,560,000	15,250,544	14,701,379	10.0%
1965	13,659,762	1,696,000	15,355,762	15,303,153	6.8%
1966	12,006,722	1,764,000	13,770,722	14,563,242	-3.1%
1957-66				122,255,624	7.7%

* Mean Capital and Surplus Plus Prepaid Expenses

INVESTED ASSETS DERIVED FROM PREMIUMS

Stock Fire and Casualty Companies
Data from Best's Aggregates and Averages
(Millions of Dollars)

	85% of Total Assets (a)	Capital and Surplus	Invested Assets Other than Capital and Surplus	Earned Premiums	Ratio (3) ÷ (4)
	(1)	(2)	(3)	(4)	(5)
1956	\$15,139	\$ 7,800	\$ 7,339	\$ 7,755	.95
1957	15,205	7,073	8,132	8,336	.98
1958	17,097	8,619	8,478	8,840	.96
1959	18,530	9,381	9,149	9,527	.96
1960	19,360	9,494	9,866	10,266	.96
1961	21,747	11,719	10,028	10,710	.94
1962	21,912	11,146	10,766	11,277	.95
1963	23,791	12,642	11,149	11,595	.96
1964	25,565	13,690	11,875	12,355	.96
1965	26,604	13,659	12,945	13,306	.97
1966	26,380	12,007	14,373	14,582	.99

(a) 85% of total assets is used as an approximation to total invested assets.