ANALYSIS OF RETURN ON SURPLUS UNDER TWO APPROACHES FOR INCLUDING INVESTMENT INCOME IN RATEMAKING

By James D. Stewart

INTRODUCTION

In recent years the controversy regarding an insurance company's treatment of the investment income earned from the assets corresponding to reserves for unearned premium and losses has reached increased intensity. The dollar magnitude of the investment earnings has reached mammoth proportions and, as such, has become highly visible. Generally, the industry would prefer to use the investment income as an additional source of capital to help supply the needed capacity expansion necessary to support the rapid premium growth occurring in today's economy. However, many of the regulators recognize the political benefits of requiring at least some of the investment income be used as an offset to, or possibly to eliminate, the profit factor companies use in setting rates.

Traditionally, if a company chose or was forced to consider investment income in its ratemaking procedure, it would use the following approach or some variation thereof: After determining its rate indication and adding an expense factor, the company would "load on" a percentage profit margin, often 5%. Then the company would estimate the annual amount of investment income it had historically earned on its premium and loss reserves. The result would be measured as a percent of written premium. This percentage would be used as a partial offset to the profit loading and the rates reduced accordingly.

During the 1975 Massachusetts Auto Rate Hearings Commissioner James M. Stone promulgated a revolutionary method for setting the profit allowance factor. Income from all sources, including investments, was to be compared to the regulator's specified "fair rate of return" or "target rate". The profit loading, whether negative or positive, would be the percentage necessary to make up the difference between the company's estimated overall profit before loading and the regulator's "fair rate of return".

The ramifications of Commissioner Stone's approach are potentially staggering and obviously multi-faceted. In this paper I seek only to compare quantitatively the effects of the two approaches for including investment income in the ratemaking process under a variety of scenarios. I will discuss the two methods in detail, describe my method of analysis, present and discuss my findings and give my conclusions.

DISCUSSION

For identification purposes, I will call the two methods for incorporating investment income into the ratemaking process the "ownership approach" and the "cash flow approach". Under the ownership approach the rates are to reflect the income from assets attributable to reserve accounts designed to recognize potential obligations to policyholders, i.e., unearned premium and loss reserves. The theory suggests that if there is money due policyholders, then the income attributable to this money should also pass to policyholders. The cash flow approach states a company is entitled to a fair rate of return on capital, but that the measurement of that return must include income from all sources, not just underwriting profits. It uses a cash flow analysis to combine all income sources into a single estimate which can then be compared to the specified fair rate of return.

The following is a more complete discussion of the concepts underlying the two methods and includes some observations about the advantages and disadvantages of each.

Ownership Approach

A. General.

The unearned premium reserve is said to represent a "quasi-trust" held by the insurance company for policyholders. Since the unearned premium has not yet been earned by, and therefore cannot "belong" to the insurance company, it must still belong to the policyholder. Logically,

then, investment income derived from the assets which represent the unearned premium reserve should directly benefit the policyholders. The reduction of rates in an amount equal to the investment income provides such a direct benefit. It is recognized that some unearned premium is not in the possession of the insurance company (because of delayed remission of premiums by agents) and that there are certain "front-end" acquisition expenses incurred by the insurance company for which it should ultimately be reimbursed. Therefore, the unearned premium "belonging" to policyholders is less than the total unearned premium by an amount reflecting delayed premium remission and pre-paid expenses.

The argument for including investment income derived from loss reserves directly into the rate-making process is not very strong. Loss reserves represent liabilities which the insurance company will pay to/for policyholders. Therefore the funds corresponding to the loss reserves are no longer available to the insurance company for any purpose it desires, it is just a matter of time before they are paid out. One could consider the funds to have been placed in a "trust account" just awaiting payment. Any benefits (investment income) should then accrue to the eventual recipient of the funds (note: to have the investment income accrue to the company would make the delay of loss payments profitable for the company). Because of practical difficulties in associating the investment income directly to the loss payees, a general reduction to the rates in an amount equal to the investment income is the compromise approach.

B. Advantages.

1. The computations are reasonably straightforward once the ground-rules have been agreed upon.

2. The necessary data for making the computations is available.

3. The industry already has experience in handling investment income under the ownership concept.

4. There is likely to be a high degree of acceptability because of the similarities of the technique to the NAIC investment income computations in the Insurance Expense Exhibit.

C. Disadvantages.

1. The underlying theory supporting the use of investment income to directly reduce the rates is not rigorous and would not be defensible under cross-examination. For example:

   a. The "trust" concept hasn't any legal justification (possibly there is some ethical basis).

   b. To apply the investment income to the ratemaking process does not necessarily benefit the people whose "assets" generated the investment income because of policyholder turnover.

   c. As stated, the greater the incurred losses, the greater the loss reserves, the larger the investment income, i.e., the poorer a company's experience, the greater the investment income offset to the rates.

   Note: Objection b) can be overcome by providing dividends to policyholders (which, conceptually, is much more logical). Objection c) can be overcome by working from the standpoint of expected loss ratios and calculated loss reserves thereon rather than using actual loss reserves.

2. Although the actual computations are reasonably straightforward, a significant number of assumptions must be introduced.

   a. Unearned premium--How should it be determined: by state? proportionately to nationwide? What is the impact of growth or

contraction? What about a given class of business versus all classes combined? How are prepaid expenses estimated? Etcetra.

b. Loss Reserves--Should unusual catastrophic losses be factored out? State versus nationwide for a class of business? Application of loss expense reserves? Etcetra.

c. Investment Income--Which assets relate to unearned premium and loss reserves? Should realized/unrealized capital gains/losses be included? How? Tax adjustments? Etcetra.

Cash Flow Approach

A. General.

When a policy is written the insurance company receives the premium after some delay and less commission, from which it "replenishes" the surplus account for the previously paid acquisition expenses associated with the policy writing. The remainder of the money is held by the company until such time as additional expense payments are made or until a loss payment is made (or theoretically released into surplus). During this period the company is able to invest the funds and thereby earn additional income. By estimating the distribution of loss payments and expense payments over time for a given set of policies written at a specific premium level, we can determine the present value of the cash flow derived from these policies for any rate of return in the investment market. The discounted cash flow, including the profit provision within the rates, provides an estimate of the income to be earned.
The next step, as outlined by Commissioner Stone, is to make an assumption regarding the premium to surplus ratio underlying the book of business. Multiply the rate of return on the premium (the estimate of income earned, found above, divided by the premium) by the premium to surplus ratio. The result combined with the investment income earned

directly by surplus is the rate of return on surplus, i.e., a measure of the profitability of the business. Then, by adjusting the profit margin included in the rates, the profitability of the business can be adjusted until it meets a specified target rate of return.

For computation purposes, the cash flow approach can be dissected as follows: An allowable or target rate of return on surplus is specified by the Insurance Commissioner. All sources of profit--investment of surplus, underwriting profit, and investment of cash flow (determined from the discounted value of the flow of premiums, expenses and losses)--are considered in attaining the target. Because of pre-determined constraints the only variable source of profit is provided by the profit allowance factor (produces underwriting profit). The allowance to be included in the rates is adjusted until:

1. The estimated total rate of return equals the target rate of return.
2. Total losses plus expenses plus income from the profit allowance equal total premium receipts.

B. Advantages.

1. There is a good body of theory supporting the discounted cash flow concept.
2. It offers an alternative to the traditional combined loss and expense ratio approach for estimating profitability by introducing a measure of generated income. If properly applied, the technique could offer a means for estimating the marginal income produced for a company by a branch for a line of business. Such a measure of economic viability could significantly improve business expansion and contraction decisions.
3. It is only technique which merges, rather than layers, investment income into the ratemaking process.

C. Disadvantages.

1. The cash flow approach is highly sophisticated and would require substantial additions to most data systems to be implemented properly.
   a. As outlined by Commissioner Stone, policy quarter data is needed to determine the appropriate loss payment distribution. Possibly, policy year data would be adequate.
   b. Better information regarding the timing of acquisition and general expense payouts are needed. Possibly a distribution of delayed premium remissions by class would be needed.
2. An appropriate discount factor for the cash flow must be determined. Note: The discount factor is subject to continual change which, depending upon the sensitivity of the numbers, could have significant impact on the results.
3. To achieve Commissioner Stone's desired end--an estimate of return on surplus--three large assumptions must be made.
   a. Loss payment and expense payment patterns remain constant during the analysis period.
   b. A reasonable premium to surplus ratio can be determined and/or predicted for an appropriate period of time.
   c. A reasonable target rate of return can be determined.
4. There is a greater needed to quantify the impact on premium writings of a given rate change to determine the input side of the cash flow equation. This could necessitate the modelling of the premium input side of the equation.

METHOD OF ANALYSIS

Computer models were developed to simulate the two approaches. Because both approaches are essentially measuring the same thing, but from different perspectives, the assumptions and input factors were constructed to allow direct comparisons of the results. Below is a list of the assumptions and factors used in the models:

	Ownership	Cash Flow
1.	Classes of business studied Private Passenger Bodily Injury Private Passenger Property Damage Private Passenger Medical Private Passenger Comprehensive Private Passenger Collision Homeowners	Same Coverages
2.	Premium assumptions $1,000 per month written premiums 12 month policy terms Premiums earned uniformly Average policy attaching date at mid-month Premiums less 15% commission are received from the agent two months after policy attaching date	Same Assumptions
3.	Loss assumptions (Exhibit 1 contains the loss distributions) 65% ultimate loss ratio (including expenses) An average policy quarter loss reserve distribution for 25 quarters developed from loss reserve information from years 1966 through 1976 A maximum policy quarter loss reserve distribution for 25 quarters was developed by multiplying the average distribution factors by 1.4. The results are conformable to the historic year which had the set of loss reserves of the greatest magnitude. A minimum policy quarter loss reserve distribution for 25 quarters was developed by multiplying the average distribution factors by .7. The results are conformable to the historic year which had the set of loss reserves of the smallest magnitude relative to the ultimate paid loss.	Same loss ratio assumption An average policy quarter paid loss distribution for 25 quarters was developed from losses paid information for years 1966 - 1976 A minimum policy quarter paid loss distribution for 25 quarters was developed by reducing each average paid loss factor by an amount sufficient to maintain a constant incurred loss distribution for each quarter given the increase in reserves. A maximum policy quarter paid loss distribution for 25 quarters was developed by increasing each average paid loss factor by an amount sufficient to maintain a constant incurred loss distribution for each quarter given the decrease in reserve.

4. Other parameters (Exhibit 2 shows the expense distribution by quarter and the computation of the tax rate on investment income)

35% expense ratio including commission	Same parameters
15% tax rate on investment income	48% tax rate on all income (this is defined in a memo from Massachusetts which describes the cash flow method of calculatin
48% tax rate on profit allowance	

5. Variables studied

Changes in loss reserve distribution	Changes in loss paid distribution
Premium to surplus ratios from .5 to 4.0 in increments of .5	Same
5% and 6% rates of return on investment in the market	Same
	Target rates of return on surplus of .08, .10, .12, and .15 after taxes (originally, Comm. Stone used .10).

Under the ownership approach investment income is calculated from the earned premium and loss reserves at a specific point in time. For ease of calculation the model was run until a point in time was reached in which generated premium income, expenses and loss reserves were in a "steady state" condition. Because all distributions were constant, such an equilibrium occurred after 25 months. These values were then used as input to make the calculations which determined the total rate of return on surplus for the system. Exhibit 3 shows two such tables of calculations. Similar tables were made for each class of business studied, for each of the different loss reserve distributions, and using both the 5% and 6% rates of return on investment.

The model for the cash flow approach calculates the investment income as an integral part of the total return in accordance with the distributions and assumptions specified for a given policy year; it operates over the entire life cycle of the policies written during a policy year. The model tests iteratively successive "profit allowance" values until either a)the total return is within 1/1000 of the target rate or b)the gap between the total rate of return and the target rate increases. The profit allowance factor was increased by .1% in each iteration. The model uses written premium less the profit allowance in calculating expenses and losses. Therefore, the expense and loss dollars paid until the

solution is obtained remain constant. Exhibit 4 shows two such tables of calculations. As was done for the ownership approach, additional tables were made for each class of business studied using the different distributions and the various assumptions.

The cash flow approach, as originally described in releases from Massachusetts, is a normative approach which uses a constant tax rate of .48. However, the ownership approach recognizes the favorable tax considerations received by the insurance industry on certain types of investments. Therefore, to make consistent comparisions between the two techniques, they should be placed on the same basis--that being before taxes. The discussion of results is based on before tax computations.

RESULTS AND CONCLUSIONS

This section is divided into four subsections: a)results for the ownership approach, b)results for the cash flow approach, c)a comparison between the two approaches, and d)general conclusions. The key element in the analysis is the degree of leverage caused by changing the variables. The discussion centers around the bodily injury and collision coverages because they represent the extremes--the former with a high level of reserving and a slow payout pattern, while the latter has a low level of reserving and a rapid payout pattern. The calculations for the other coverages were substantially closer to the collision results than to the bodily injury figures, even for medical.

Ownership Approach

A. Premium to Surplus Ratios

The leverage involved as premium to surplus ratios increased was substantial. For every .5 increase in the ratio, the total rate of return on surplus is increased from a low of 3.1 percentage points for Collision to a high of 4.8 points for Bodily Injury. Exhibit 3 demonstrates these results. When the surplus is reduced to raise the premium to surplus

ratio by .5, the income generated from premium remains constant and, therefore, as a ratio to surplus increases correspondingly.

B. Investment Yield

At the lower premium to surplus ratios the change from 5% to 6% return on investment netted 15-16% increases on the rates of return on surplus for all coverages. However, at higher ratios the increase dropped to 9% for collision, although bodily injury still showed a 12.5% increase.

C. Loss Reserve Patterns

Depending upon the coverage, a change in the loss reserve pattern produced significant leverage. A maximum 2.5% variation in return on surplus occurred for collision, but bodily injury showed a 14% change at the higher premium to surplus ratios. The point change for the two coverages is as follows:

	Amount Rate of Return on Surplus Changed by	
	High Reserving Pattern	Low Reserving Pattern
Bodily Injury--Low P/S	+ .7	- .6
--High P/S	+6.1	-4.6
Collision --Low P/S	+ .1	.0
--High P/S	+ .7	- .6

The graphs shown in Exhibit 5 summarize much of the findings for the ownership approach.

Cash Flow Approach

A. Premium to Surplus Ratios

The negative impact on the profit allowance for a given rate of return on investment and for a specified target rate caused by increases to the premium to surplus ratios is substantial. Two facts should be noted: First, because both the profit allowance and the cash flow from premiums received and losses paid must be multiplied by the premium to surplus ratio in the formula to attain the target rate, as the ratio increases the dollars necessary to reach the target rate shrink. Second, regardless

of the coverage, the same amount of income is provided by the return from surplus. Therefore, the profit allowance and the cash flow combined must always be the same for a given premium to surplus ratio. As a result, the rate of decrease for the profit allowance is identical for all classes of business and payment patterns for any specified target rate and rate of return on investment. A comparison between the Bodily Injury and Collision tables in Exhibit 4 shows the total difference between the ratios of .5 and 4.0 to be -30.3 points. The rate of decrease is as follows:

P/S Ratio.....	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.(
Profit Allowance Decrease.....	-17.3	-5.75	-2.9	-1.75	-1.15	-.8	-.65	

B. Investment Yield

The leverage associated with a change from 5% to 6% rate of return on investment had an important impact on the results. The coverages with slower payout patterns were impacted more. Because the total allowable income (for a given premium to surplus ratio) is fixed by the target rate, the increased income derived from both surplus and the investment of cash flow requires the profit allowance to drop significantly. At the higher premium to surplus ratios the percentage changes were greater than at the lower ratios even though magnitude of the changes was not as large.

C. Loss Payment Patterns

The change in loss payment patterns resulted in constant numeric changes to the profit allowance, regardless of the premium to surplus ratio. Therefore, the percentage impact was continually increasing. The percentage changes also varied significantly by coverage because of the differing contributions of the cash flow to the attainment of the target rate of return for each coverage. The following table presents the

highlights:

	Amount Profit Allowance Changed by Slow Payout Pattern	Fast Payout Pattern
Bodily Injury	-2.2 to -2.3 pts.	+1.9 to +2.0 pts.
Collision	- .2 to - .3	+ .2

The graphs shown in Exhibit 6, Parts A and B portray the findings for premium to surplus ratios, investment yield and loss payment patterns.

D. Target Rate of Return

As the target rate of return was shifted upward, the profit allownace also shifted upward. At each premium to surplus ratio the numeric change to the profit allowance was constant for all the coverages and payment patterns. The use of 6% rather than 5% rate of return on investment had minimal impact on this finding. Essentially, the reason is that an increase in the target return is attained by an adjustment to the cash flow and the profit allowance. For all payment patterns these two elements adjusted at the same rate. The graph in Exhibit 6, Part C provides a pictorial representation.

Comparative Analysis

The following comparisions show the premium to surplus ratios for which "cross-overs" of the return on surplus occur between the two methods. Because Massachusetts' target rate was set at 10% after taxes, the comparisions use the cash flow model results for .10/.52.

Since the coverages analyzed have substantially different payment patterns, the premium to surplus ratios at which a profit allownace of 5% or greater is acceptable (using the cash flow approach) are not common to the coverages. The first table shows the ratio (in ascending order from .5 to 4.0) at which a 5% profit allowance would not be allowable because it would produce a rate of return on surplus in excess of 19.2% (.10/.52).

	5% Return on Investment			6% Return
	Payment Pattern			Pattern
	Average	Slow	Fast	Average
Bodily Injury	1.5	1.5	2.0	1.5
Collision	2.5	2.5	3.0	2.5
Homeowners	2.5	2.0	2.5	2.0

Essentially, the table shows the premium to surplus ratios that it is necessary to be lower than, if one is to better the total return provided by the 5% profit allowance called for by the ownership approach, when a 10% target rate has been promulgated.

The next table shows the first ratio for which the ownership approach model produced total returns above the 10% after tax return allowed by the cash flow target rate constraint.

	5% Return on Investment			6% Return
	Reserving Pattern			Pattern
	Average	High	Low	Average
Bodily Injury	1.5	1.5	2.0	1.5
Collision	2.5	2.5	2.5	2.0
Homeowners	2.5	2.0	2.5	2.0

General Conclusions

A number of general conclusions can be stated:

A. The higher the premium to surplus ratio, the greater the relative advantage of the ownership method (a given progit allowance has a greater impact on the return on surplus as the surplus becomes comparatively less).

B. The higher the available rate of return on investment, the greater the relative advantage of the ownership approach (more of the allowable return on surplus in the cash flow method will be derived directly from surplus and from investment of cash slow).

C. The longer the payout pattern for a particular coverage, the greater the relative advantage of the ownership approach (more of the allowable return on surplus in the cash flow approach will be derived from investment of cash flow, i.e., the longer the funds are available, the more they can earn). Note: Although the data used reflected inflationary trends to some degree, an inherent assumption of rate adequacy within the models may actually have caused the ownership method's advantage to have been understated.

D. The higher the allowable target rate of return, the more favorable the cash flow approach becomes (the higher target does not affect the return on surplus or the investment of cash flow, therefore more of the return must come directly from the profit allowance).

However, one marked advantage of the cash flow approach is its inherent cohesiveness. It provides a realistic, consistent means for evaluating the impact of a set of policies or a rate change on a company's financial position. It permits one to measure the dollar contribution of a class of business, an office, or a state, etc., as an entity over a period of time. It also points out how the income pieces must fit together to accomplish a given profit goal. While it may have drawbacks, the cash flow approach should be recognized as a powerful tool for decision making within the insurance industry.

EXHIBIT 1

DISTRIBUTIONS FOR AVERAGE LOSS RESERVE LEVELS

1. BODILY INJURY

Qtr.	Factor	Qtr.	Factor	Qtr.	Factor
1	.0168	10	.2347	18	.0747
2	.0711	11	.2065	19	.0629
3	.1462	12	.1870	20	.0575
4	.2256	13	.1519	21	.0399
5	.2959	14	.1420	22	.0400
6	.3250	15	.1220	23	.0364
7	.3124	16	.0961	24	.0335
8	.2953	17	.0807	25	.0177
9	.2557				

2. COLLISION

1	.0213	10	.0077	18	.0010
2	.0506	11	.0057	19	.0009
3	.0662	12	.0045	20	.0006
4	.0773	13	.0031	21	.0003
5	.0844	14	.0027	22	.0003
6	.0441	15	.0022	23	.0003
7	.0289	16	.0016	24	.0003
8	.0162	17	.0011	25	.0003
9	.0119				

DISTRIBUTIONS FOR AVERAGE LOSS PAYMENT RATE

1. BODILY INJURY

1	.0004	10	.0446	18	.0141
2	.0129	11	.0399	19	.0164
3	.0265	12	.0297	20	.0091
4	.0451	13	.0302	21	.0077
5	.0437	14	.0265	22	.0088
6	.0548	15	.0248	23	.0082
7	.0575	16	.0199	24	.0054
8	.0490	17	.0185	25	.0063
9	.0499				

2. COLLISION

1	.0173	10	-.0016	18	-.0001
2	.1445	11	-.0012	19	-.0002
3	.1583	12	-.0010	20	-.0002
4	.1645	13	-.0006	21	-.0003
5	.1122	14	-.0009	22	-.0002
6	.0598	15	-.0005	23	-.0001
7	.0045	16	-.0005	24	.0000
8	-.0015	17	-.0003	25	-.0001
9	-.0018				

EXHIBIT 2

UNDERWRITING EXPENSE DISTRIBUTION
(Used for both Bodily Injury and Collision)

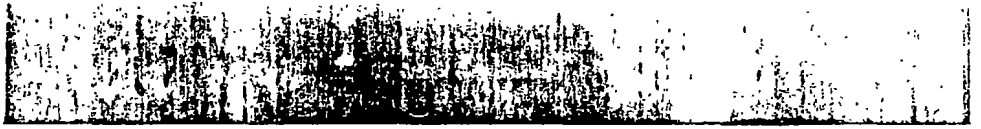
Quarter	Factor
1	.150
2	.027
3	.013
4	.006
5	.002
6	.002

CALCULATION OF AVERAGE TAX RATE FOR INVESTMENT INCOME

Data Source: Consolidated Annual Statement for "Blank" Insurance Company, Underwriting and Investment Exhibit, Part 1

Investment Category	Tax Rate*	Income	Exp. Alloc. to Category	Net Income
Bonds:				
Taxable	.48	10,730,358	721,677	10,008,781
Non-Taxable	.00	28,173,348	1,894,799	26,278,549
Stocks	.072	9,392,362	631,683	8,760,679
Mortgage Loans	.48	14,794	995	13,799
Real Estate	.48	2,128,220	439,271	1,683,949
Collateral Loans	.48	382,485	25,724	356,761
Cash	.48	801,903	53,932	747,971
Other:				
Type 1	.00	57,893	3,861	54,032
Type 2	.48	1,181,444	79,458	1,101,986
Totals		52,857,942	3,851,400	49,006,507

Average Tax Rate = Tax Rate for each Category weighted by the Net Income; Summed; Divided by Total Net Income
= 14.91, rounded equals 15%.



('AVERAGE' LOSS RESERVE DISTRIBUTION)

A. INCOME FROM UNEARNED PREMIUM RESERVE

1. AVERAGE UNEARNED PREMIUM RESERVE FOR 12 MONTHS		$ 6,000
2. LESS: DELAYED PREMIUM REMISSION (6,000- 2,100) * .16)	624	2,724
3. NET AVAILABLE FOR INVESTMENT		3,276
4. INVESTMENT EARNINGS (3,276 * .05, COMPOUNDED)		168

B. INCOME FROM LOSS RESERVE

1. AVERAGE LOSS RESERVE FOR 12 MONTHS		$ 1,300
2. LESS: DELAYED PREMIUM REMISSION		208
3. NET AVAILABLE FOR INVESTMENT		1,092
4. INVESTMENT EARNINGS (1,092 * .05, COMPOUNDED)		56

C. INCOME FROM PROFIT ALLOWANCE (APPROXIMATE) $ 210

D. INVESTMENT RETURN ON PROFIT ALLOWANCE (APPROXIMATE) $ 13

E. TOTAL INCOME FROM PREMIUM SOURCES (BEFORE TAXES) $ 710

F. TOTAL INCOME FROM PREMIUM SOURCES (AFTER TAXES) $ 466

G. RATES OF RETURN AT SELECTED PREMIUM/SURPLUS RATIOS

PREMIUM/SURPLUS RATIOS	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
INCOME FROM PREMIUM (A.F.)	747	747	747	747	747	747	747	747
RATE OF RETURN/SURPLUS	3.1	6.2	9.3	12.4	15.6	18.7	21.8	24.9
INCOME FROM SURPLUS (B.F.)	1,228	614	409	307	246	205	175	153
TOTAL RETURN	1,974	1,360	1,156	1,053	992	951	922	900
TOTAL RATE OF RETURN/SURPLUS	8.2	11.3	14.4	17.6	20.7	23.8	26.9	30.0
INCOME FROM PREMIUM (A.F.)	466	466	466	466	466	466	466	466
RATE OF RETURN/SURPLUS	1.9	3.9	5.8	7.8	9.7	11.7	13.6	15.5
INCOME FROM SURPLUS (B.F.)	1,044	522	348	261	209	174	149	130
TOTAL RETURN	1,510	988	814	727	675	640	615	597
TOTAL RATE OF RETURN/SURPLUS	6.3	8.2	10.2	12.1	14.1	16.0	17.9	19.9

EXHIBIT 3

("AVERAGE" LOSS RESERVE DISTRIBUTION)

A. INCOME FROM UNEARNED PREMIUM RESERVE

1. AVERAGE UNEARNED PREMIUM RESERVE FOR 12 MONTHS $ 6,000
2. [illegible]
3. NET AVAILABLE FOR INVESTMENT 3,476
4. INVESTMENT EARNINGS (3,276 * .05, COMPOUNDED) 168

B. INCOME FROM LOSS RESERVE

1. AVERAGE LOSS RESERVE FOR 12 MONTHS $ 10,583
2. LESS [illegible]
3. NET AVAILABLE FOR INVESTMENT 8,890
4. INVESTMENT EARNINGS (8,890 * .05, COMPOUNDED) 455

C. INCOME FROM [illegible]

D. INVESTMENT RETURN ON PROFIT ALLOWANCE (APPROXIMATE) $ 13

E. TOTAL INCOME FROM [illegible]

F. TOTAL INCOME FROM PREMIUM SOURCES (AFTER TAXES) $ 805

G. RATES OF RETURN AT SELECTED PREMIUM/SURPLUS RATIOS

PREMIUM/SURPLUS RATIOS	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
INCOME FROM PREMIUM (B.1)	1,145	1,145	1,145	1,145	1,145	1,145	1,145	1,145
RATE OF RETURN/SURPLUS	4.8	9.5	14.3	19.1	23.9	28.6	33.4	38.2
INCOME FROM SURPLUS (B.1.)	1,228	614	409	307	246	205	175	153
TOTAL RETURN	2,373	1,759	1,555	1,452	1,391	1,350	1,321	1,299
TOTAL RATE OF RETURN/SURPLUS	9.9	14.7	19.4	24.2	29.0	33.8	38.5	43.3
INCOME FROM PREMIUM (A.1.)	805	805	805	805	805	805	805	805
RATE OF RETURN/SURPLUS	3.4	6.7	10.1	13.4	16.8	20.1	23.5	26.8
INCOME FROM SURPLUS (A.1.)	1,044	522	348	261	209	174	149	130
TOTAL RETURN	1,849	1,327	1,153	1,066	1,014	979	954	936
TOTAL RATE OF RETURN/SURPLUS	7.7	11.1	14.4	17.8	21.1	24.5	27.8	31.2

EXHIBIT 4

CALCULATIONS FOR BODILY INJURY

('AVERAGE' PAID DISTRIBUTION/ .1 /.52 TARGET RATE/ 5% INTEREST)

PREMIUM/SURPLUS RATIO *	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
WRITTEN PREMIUM	15,192	13,116	12,432	12,084	11,868	11,736	11,640	11,556
PREMIUMS RECEIVED	12,913	11,149	10,567	10,271	10,088	9,976	9,894	9,823
UNDERWRITING EXPENSES	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
LOSSES PAID	7,792	7,792	7,792	7,792	7,792	7,792	7,792	7,792
ULTIMATE LOSS RATIO	51.3%	59.4%	62.7%	64.5%	65.7%	66.4%	66.9%	67.4%
CASH FLOW (PROFIT)	2,721	956	375	79	- 105	- 217	- 298	- 370
INCOME VALUE OF CASH FLOW	692	749	768	778	784	787	790	792
INCOME FROM SURPLUS	1,200	600	400	300	240	200	171	150
TOTAL INCOME	4,612	2,305	1,543	1,157	919	771	663	573
RATE OF PROFIT TO SURPLUS	11.3%	8.0%	4.7%	1.3%	- 2.2%	- 5.4%	- 8.7%	-12.3%
RATE OF PROFIT TO PREMIUM	17.9%	7.3%	3.0%	.7%	- .9%	- 1.8%	- 2.6%	- 3.2%
RATE OF PROFIT LOADING **	26.6%	9.3%	3.6%	.7%	- 1.1%	- 2.2%	- 3.0%	- 3.7%

* AMOUNT OF SURPLUS DETERMINED FROM PREMIUM PRIOR TO PROFIT LOADING

** PROFIT LOADING IS THE DIFFERENCE BETWEEN ACTUAL PREMIUM AND PREMIUM PRIOR TO LOADING

CALCULATIONS FOR COLLISION

('AVERAGE' PAID DISTRIBUTION/ .1 /.52 TARGET RATE/ 5% INTEREST)

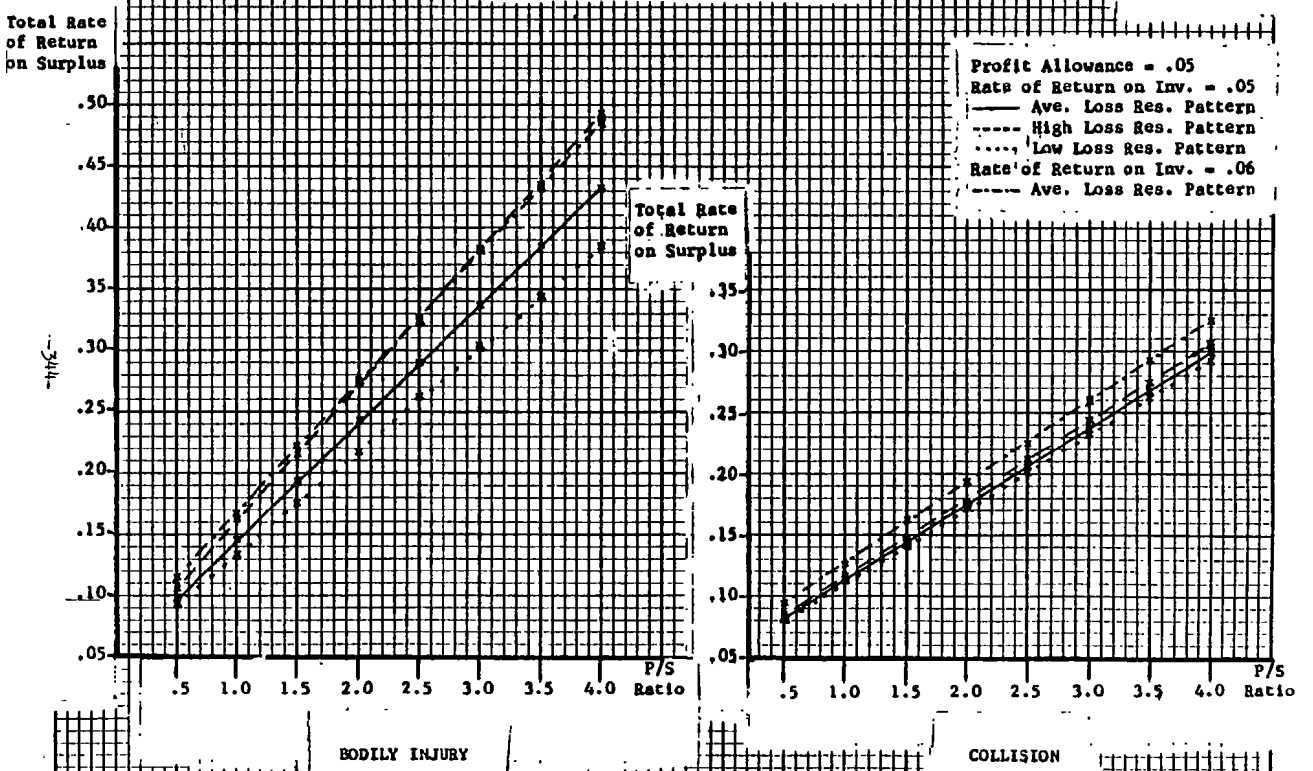
PREMIUM/SURPLUS RATIO *	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
WRITTEN PREMIUM	15,912	13,836	13,140	12,792	12,588	12,444	12,348	12,276
PREMIUMS RECEIVED	13,525	11,761	11,169	10,873	10,700	10,577	10,496	10,435
UNDERWRITING EXPENSES	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
LOSSES PAID	7,800	7,800	7,800	7,800	7,800	7,800	7,800	7,800
ULTIMATE LOSS RATIO	49.0%	56.4%	59.4%	61.0%	62.0%	62.7%	63.2%	63.5%
CASH FLOW (PROFIT)	3,325	1,560	969	673	500	377	296	235
INCOME VALUE OF CASH FLOW	93	150	170	179	185	189	191	193
INCOME FROM SURPLUS	1,200	600	400	300	240	200	171	150
TOTAL INCOME	4,618	2,311	1,538	1,152	925	766	659	578
RATE OF PROFIT TO SURPLUS	13.9%	13.0%	12.1%	11.2%	10.4%	9.4%	8.6%	7.8%
RATE OF PROFIT TO PREMIUM	20.9%	11.3%	7.4%	5.3%	4.0%	3.0%	2.4%	1.9%
RATE OF PROFIT LOADING **	32.6%	15.3%	9.5%	6.6%	4.9%	3.7%	2.9%	2.3%

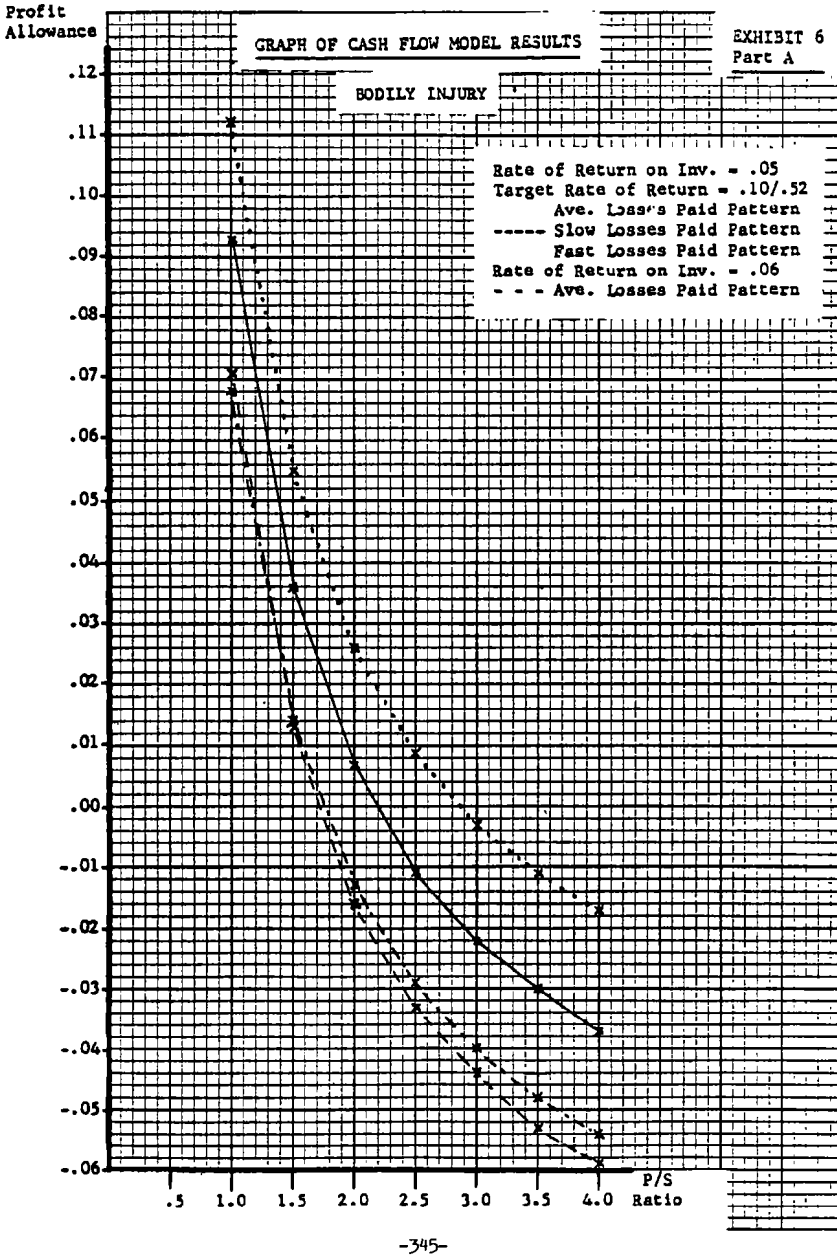
* AMOUNT OF SURPLUS DETERMINED FROM PREMIUM PRIOR TO PROFIT LOADING

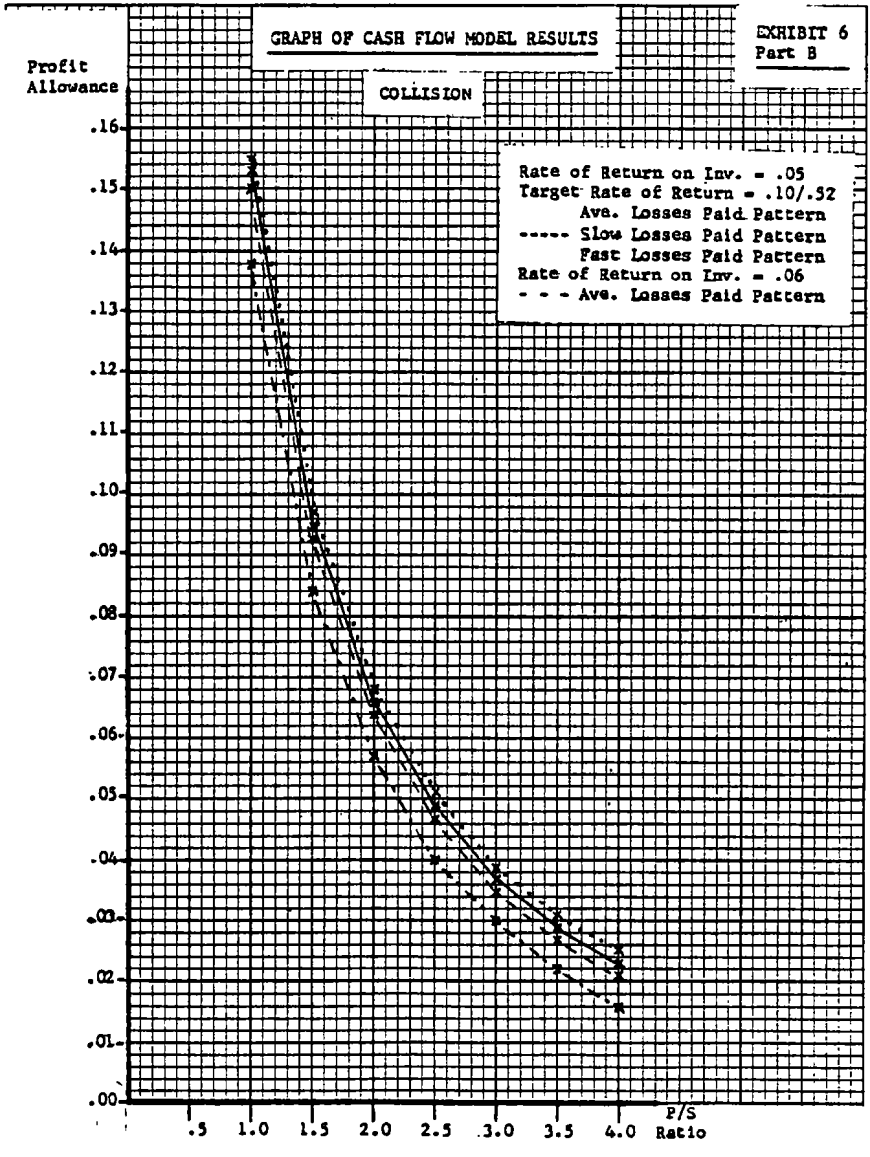
** PROFIT LOADING IS THE DIFFERENCE BETWEEN ACTUAL PREMIUM AND PREMIUM PRIOR TO LOADING

GRAPH OF OWNERSHIP MODEL RESULTS

EXHIBIT 5




Profit Allowance
GRAPH OF CASH FLOW MODEL RESULTS
EXHIBIT 6 Part A
BODILY INJURY
Rate of Return on Inv. = .05
Target Rate of Return = .10/.52
Ave. Losses Paid Pattern
----- Slow Losses Paid Pattern
Fast Losses Paid Pattern
Rate of Return on Inv. = .06
- - - Ave. Losses Paid Pattern
.12
.11
.10
.09
.08
.07
.06
.05
.04
.03
.02
.01
.00
-.01
-.02
-.03
-.04
-.05
-.06
.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
P/S Ratio



GRAPH OF CASH FLOW MODEL RESULTS

EXHIBIT 6
Part C