ANALYSIS OF SURPLUS AND RATE OF RETURN WITHOUT USING LEVERAGE RATIOS

by

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BIOGRAPHY:

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ABSTRACT:

Modern risk theory has shown that the optimum risk-based surplus, once determined, can not be subdivided by line by state. It also follows that ratios of premiums to surplus (leverage ratios) do not exist which can by applied generally to property/casualty insurers in order to impute a surplus by line by state. Given that a rate of return can not be determined with respect to an allocation of surplus by line by state, the challenge presents itself as to how to determine the required rate of return for the industry and a particular insurer. The required rate of return must be based on a definition of rate of return measured by the annual change in surplus adjusted for stockholder dividends and capital paid-in. The required rate of return is determined from the general principles of economics, combined with an actuarial analysis of the structure and trends in the insurance industry. The required rate of return is different for stock and mutual insurers. The rate of return to the mutual insurer need only be enough to support the business to be written in the next year. The rate of return for stock insurers is based on the rate of return on book value necessary to attract capital, but the rate of return to the investor is based on the rate of return on market value, which is connected to book value by the market/book ratio.

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INTRODUCTION

Surplus and the rate of return on surplus are the principle elements of the subject of "Insurer Financial Solvency", the subject of this Call Paper Program. Under the regulatory laws of most states, the state insurance officials can take regulatory action if either the risk-based surplus is deficient or the rate of return (profitability) is deficient to the extent that the insurer is considered to be in hazardous condition. From an actuarial and financial point of view, the required risk-based surplus and the required rate of return on surplus are interrelated and must be in balance. The 1979 Call Paper Program entitled, "Total Return Due A Property-Casualty Insurance Company," covered extensively such topics as risk and return, the impact of inflation, calculating minimum surplus requirements, profits necessary for growth, and regulation of rate of return. Other call paper programs have expanded on these subjects as well.

However, ten years later, the California Proposition 103 rate of return hearings have revealed that many deficiencies still exist in the understanding of property/casualty insurance company financial solvency. Even though some of the country's leading financial economists, investment experts, and actuaries were called to testify and, in many cases, submitted lengthy written documents, what emerged was a perception that no unified theory has yet been worked out which would connect an insurer's required level of surplus with the proper measurement of the profitability necessary to achieve that level of surplus. Casualty actuaries estimate required rates based mainly on an individual insurer's losses, claims inflation, and frequency trends. Financial economists deal with such issues as optimizing investment strategies, the pricing of assets, the relationship between profit and risk, solvency, and ruin probabilities. In the future, it is clear that the casualty actuaries and the financial economists will be working more closely together.

In the California Proposition 103 hearings, the proposed approach by the regulators for measuring rate of return was to take an insurer's national figures for expenses, investment income, capital gains or losses, and federal taxes and to allocate these figures proportionately to get by line by state results, which were then combined with the state loss experience to get a profit or rate of return as a percent of premium. The

insurer's surplus was then imputed by line by state using estimated premium to surplus ratios, called "leverage ratios", to get a rate of return by line for the state as a percent of surplus (or net worth). The leverage ratios would vary by line of insurance depending on the perceived risk, such as a 2.5 ratio of premiums to surplus for homeowners insurance, but a 1.0 ratio for medical malpractice. This approach has long since proven to be defective and unworkable and was so characterized by many witnesses. The problem is that the insurance business involves a wide range of risks from underwriting and investment to catastrophe and credit, some of which are unrelated to the premium volume in a given year. The result is that the true premium to surplus ratios can vary widely between insurers writing the same lines of business. A simple example would be two insurers currently writing the same premium volume in automobile liability insurance, where one insurer has large loss reserves from business written in prior years and another, new insurer which has practically no loss reserves from prior years. Clearly, the required risk-based surplus would be different for these two insurers.

For many years, the National Association of Insurance Commissioners (NAIC) has been attempting to measure profitability by line in the Insurance Expense Exhibit (IEE), which is filed annually by every insurer. The IEE attempts to measure profitability by matching calendar year losses, expenses and investment income allocated by line to annual premiums. Besides the mismatch between premiums and calendar year loss, expense, and investment data, the mistake is made to relate the results to surplus by allocating surplus by line, or investment income on surplus by line, or by using leverage ratios. In any event, the IEE will never be a useful regulatory tool until there is a proper matching of losses, expenses, and investment income with annual premiums, and a proper analysis of risk-based surplus.

In the meantime, the regulatory process seems to demand a rate of return calculation by line by state. An irony of the rate of return process in ratemaking is that the losses, expenses, and investment income would be meticulously calculated, sometimes using a complicated discounted cash flow approach, and then a crudely estimated leverage ratio will be used which can only give a crude estimate of the rate of return on surplus.

The purpose of this paper is to describe some of the serious misconceptions about insurance which underlie the use of leverage ratios and to demonstrate that the issues of "fair and reasonable return" and the proper measure of income and return should all be analyzed using the general principles of economics, combined with an actuarial analysis of the structure and trends in the insurance industry.

SURPLUS AND RISK

In order to make a rate of return calculation, the profit as determined must be compared to some base. The base could be invested assets, premium volume, or surplus. In the case of surplus, in order to get a by line by state measure of rate of return, an insurer's surplus is imputed by line by state using leverage ratios. Alternatively, the surplus is subdivided by line by state in proportion to either premiums, reserves, or a combination of premiums and reserves. Both methods are essentially the same and both have the same theoretical faults.

For a given multi-line, multi-state insurer, there is an appropriate level of risk-based surplus. This level of surplus is based on the sources of risk, which include:

(1) underwriting risk - the adequacy of the premium to pay losses and expenses.
(2) investment income risk - whether or not the expected investment income or interest yield is realized.
(3) investment asset risk - the leverage of invested assets to surplus, particularly with respect to fluctuations in market values, probability of default, and the asset/liability cash flow.
(4) reserve risk - the leverage of total reserves to surplus, particularly the loss and expense reserves.
(5) social risk - such as inflation, changes in the law, and changes in claim frequency due to the economy.
(6) catastrophe risk - the whole of an insurer's surplus is at risk for a catastrophe in any one state or line of insurance.
(7) credit risk - ceded reinsurance balances and agents' balances.

Clearly, many of the risks, especially the asset and investment income risks, are unrelated to the particular lines of insurance. In addition, there are risk interactions between the lines of insurance and between the various sources of risk. The appropriate level of risk-based surplus is determined for the insurer as a whole and will vary between insurers of the same size. If for each state and each line, the appropriate risk-based surplus were determined separately, then the aggregate surplus would be too great; that is, there would be an inefficient use of capital.

This point has been proven with great rigor and completeness in the 1989 book entitled, Insurance Solvency and Financial Strength, by Pentikainen, Bonsdorff, Pesonen, Rantala, and Ruohonen. These

Finnish authors are the world's leading theoreticians on the subject of risk and solvency. The conclusion of their work is that an appropriate aggregate surplus is unique to each insurer depending on all the sources of risk. These sources of risk interact. The result is that the premium to surplus ratios of insurers may vary widely. A result of their analysis is that an appropriate aggregate surplus once determined cannot be subdivided or allocated by line by state, nor by year. Furthermore, even if premium to surplus ratios could be determined by line by state for each insurer, they would not be the same between insurers.

Thus, only two quantities are meaningful: (a) the required surplus of the insurer group and, (b) the required marginal surplus for a specified change in assets, liabilities, or premiums. Therefore, there are no fixed premium to surplus ratios by line which are appropriate for all insurers.

The California Proposition 103 hearings are also showing that you get strange results when you attempt to subdivide surplus. The high point of absurdity was reached in the Proposition 103 hearings when the California Insurance Department published a proposed allocation of surplus for earthquake insurance using a one dollar of premium to one dollar of surplus ratio. In fact, for a portfolio of dwellings in one earthquake zone, as much as seventy-five dollars of surplus may be required for each dollar of premium, which is why earthquake insurance can only really be sold by a multi-line insurer. The earthquake coverage is a clear example of a situation in which the required surplus is so great that the whole of the insurer's surplus is at stake. This is true of any catastrophe potential, and one of the fundamental reasons why reinsurance is used to protect the insurer's surplus against catastrophic losses.

Inevitably, the insurer's actual surplus will be more or less than the surplus imputed to the insurer based on the leverage ratios, yet the investment income is based on the actual surplus. Technical problems such as this make the use of leverage ratios almost unworkable from the start. When the actual surplus is subdivided by line by state in proportion to reserves, premiums, or a combination of reserves and premiums, the resulting allocation will most likely be too low for the particular line and state. Furthermore, if surplus cannot be allocated, it follows that the investment income on surplus cannot be allocated by line by state.

Myers and Cohn prepared a famous paper for the 1982 Massachusetts automobile rate hearings (published in Fair Rate of Return in Property - Liability Insurance). The paper is famous because it outlines a discounted cash flow model using risk-based discount rates derived from the capital asset pricing model. The paper contains this sentence (p.68): "The premiums-to-surplus ratio is assumed to be given

exogenously - e.g., by the regulator." The Proposition 103 hearings are showing the world that regulators are not up to doing that correctly.

The question then arises, if leverage ratios cannot be used, how can a rate of return be measured? Before that question can be answered, it is first necessary to determine the proper measure of income.

WHAT IS INCOME?

There have been endless discussions through the years on what constitutes income in calculating rates of return. A common assertion is that "total rate of return" should be used. However, when this term is explained, it is revealed that many items of income are omitted, especially either realized or unrealized capital gains and losses. This issue of "what is income?" has a long history, and, surprisingly, disagreement is still widespread.

In 1921, the National Association of Insurance Commissioners adopted the so-called 1921 Profit Formula, which provided that (see NAIC (1922), NAIC (1970)):

(1) a reasonable underwriting profit is 5% of premiums plus 3% for conflagrations, and
(2) no items of profit or loss connected with the so-called banking end of the business should be taken into consideration.

This remained the standard meaning of income until 1970. In that year, the NAIC published a 233 page study of the issue prepared by the NAIC Central Office. The study for the most part was only a discussion of insurance accounting and a discussion of numerous approaches and techniques that have been proposed to measure profitability. Such approaches included use of investment earnings on unearned premiums and/or loss reserves, including or excluding realized and/or unrealized capital gains. There are also discussions of premium to surplus leverage, proper level of surplus, policyholder versus stockholder surplus, and the need to attract capital. Also, the study noted that income can be measured against sales, net worth, or total investable funds, each with its advantages and disadvantages. The proper base against which income is compared is as important an issue as the issue of what is income.

The most important result of this study is that it repudiated the 1921 Profit Formula. The study

recommended that income from all sources be ascertained and considered, including income on capital funds. However, the study reported that it could not conclude how much capital was required nor the proper base against which to measure rate of return. The study concluded that income should be determined from an investor's perspective.

The issue was not raised again by the NAIC until 1984, when the "NAIC Study of Investment Income" was published as a supplement to Volume II of the 1984 NAIC Proceedings. By 1984, interest rates, and therefore investment income, had risen so high that now investment income has become the dominant, if not the only, source of net income for insurers. The study easily reaffirmed the repudiation of the 1921 Profit Formula. The study concluded that the "total return approach" was most appropriate in regulating property/casualty insurance rates. However, the approach suggested in the study contained the same defects, intractable problems, and dead ends that were to visit the Proposition 103 hearings later. Namely,

(1) despite the use of the term "total return approach", significant items of income are excluded, such as unrealized capital gains, policy fees and sometimes even realized capital gains.
(2) the approach suggested relied on an allocation of surplus by line by state in order to set a by line by state rate of return. Modern risk theory has conclusively shown that it is not meaningful to do this. Curiously, the study eventually recognized this, but did not attempt to suggest a solution or an alternative.
(3) there is an implication that the proper rate of return is a constant to be determined. In fact, it is a dynamic target, requiring econometric expertise to determine.

Most of the reason for the controversy lies in the question, "whose income is it?" The claim that income on stockholder invested funds belongs to stockholders and income on policyholder invested funds belongs to policyholders only distracts from the proper analysis.

"Net income" as used in the annual statement is mainly a federal income tax calculation. The true income in economic terms is the annual increase in net worth of the business, which is also the true income from the management and investor perspective. Specifically, if an insurer's annual statement for 1989 reports the following figures:

Surplus at 12/31/88	$10,000,000
Surplus at 12/31/89	$12,000,000
Stockholders dividends	$500,000
Additional paid-in capital	$1,000,000

Then the income of the insurer based on the business conducted in 1989 is:

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Income = ($12,000,00 - $10,000,000) + $500,000 -
            $1,000,000 = $1,500,000
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In other words, if there were no dividends or capital paid in, then the business earned $1,500,000, or 15% of $10,000,000, the initial net worth, which we call surplus. Thus, the insurer earned a 15% rate of return.

Let **S** equal the beginning statutory surplus of the insurer. Let **dS** equal the increase in surplus over the year, including stockholder dividends and excluding additional paid-in capital. Then the term **dS/S** is the total rate of return.

The calculation of **dS** is shown in detail on page 4 of every insurer's Annual Statement. For 1989 and 1990, the industry results were:

	1989	1990
dS = net underwriting gain or loss	-$16,895m	-$18,587m
+ net investment income	31,207	32,901
+ net realized capital gains or losses	4,649	2,880
+ other income	-1,228	-425
- dividends to policyholders	2,713	2,640
- federal taxes	2,802	3,299
+ net unrealized capital gains or losses	8,035	-5,116
+ change in non-admitted assets	43	-272
+ change in liability for reinsurance	-702	8
+ change in foreign exchange	29	-60
+ change in excess statutory reserves	195	429
+ other write-in items	299	105
= total economic income	$20,117m	$5,714m

Therefore, **dS/S** = 20,117/117,935 = 17.0% for 1989, since the surplus of the industry was $117,935 million at the beginning of 1989; and **dS/S** = 5,714/134,916 = 4.2% for 1990, since the surplus was $134,916 million at the beginning of 1990. By this measure, 1990 was not a good year for the industry.

It is rare to see in the literature it advocated that the definition of income should be expanded to be defined in terms of change in surplus, yet this is the only true definition of economic income and the only definition which includes <u>all</u> sources of income. (In the 1979 Call Paper Program, Butsic used a variation of this definition and others implied this definition by advocating the inclusion of unrealized capital gains.) Note the importance of net unrealized capital gains and losses in both 1989 and 1990, which must be considered because they are real gains and losses from an economic and business point of view, even though they add a volatility to calculated rate of return.

If instead surplus is measured on a generally accepted accounting principle (GAAP) basis, then we get

GAAP net worth from statutory surplus as follows:

To statutory surplus (SAP)
Add: unauthorized reinsurance
excess statutory reserves
prepaid expenses
non-admitted assets
special reserves
Less: tax on prepaid expenses
tax on unrealized capital gains
Equals GAAP net worth.

It turns out that GAAP net worth is equal to about 1.15-1.20 times SAP surplus. Since prepaid expenses are by far the dominant item and since prepaid expenses are proportional to premiums, which in turn, are proportional to surplus, it is often assumed that GAAP net worth is proportional to SAP surplus by a fixed factor, such as 1.15 or 1.20. In that event, dS/S is the same whether S is based on GAAP or SAP. dS/S has the property that any change in the accounting definition of surplus will affect both the numerator and the denominator. Therefore, the total rate of return is almost independent of the definition of surplus. The definition of surplus can be affected by whether or not the discounting of reserves is allowed or whether or not the market value of bonds is used.

"FAIR AND REASONABLE RATE OF RETURN"

That a regulated industry is entitled to earn a fair (or just) and reasonable rate of return was affirmed in the U. S. Supreme Court case, Hope Natural Gas. When Proposition 103 passed, the insurance industry immediately sued over the provision requiring a 20% rollback. In the resulting case, Calfarm Insurance Company, the California Supreme Court referred to Hope Natural Gas to affirm the fair and reasonable rate of return standard for insurers under Proposition 103 and under state regulation in general.

In this famous case, the U.S. Supreme Court enunciated the test that income or return to the equity owner should:

(1) be commensurate with returns on investments in other enterprises having corresponding risks, and
(2) be sufficient to attract capital and maintain credit.

This test is what is meant by the term, "fair and reasonable rate of return". The only definition of income which can be used in the application of this test is the change in net worth.

Unfortunately, a "fair and reasonable" rate of return is not necessarily something which can be measured. Like the concept of "competition", it can only be described. That is, we can only determine whether the rate of return is adequate or inadequate in the present economic environment, but we can't give it a number, such as 11.2%. For instance, the rate of return is adequate if

- the industry attracts capital
- new companies are being formed

and inadequate if

- stockholder dividends exceed the in-flow of capital
- little competition exists or companies are withdrawing.

Therefore, there must also be a perception that a fair and reasonable rate of return will be obtainable in the future.

The law does not require a fair and reasonable rate of return for each insurer, but only the fair and reasonable opportunity to make a fair and reasonable rate of return. This distinction is very important in the regulatory rate approval process. The issue is whether average expenses, actual expenses, or capped expenses should be allowed. Inefficient insurers should not be protected, nor should efficient insurers be penalized. Similarly, heavily capitalized insurers should not be forced to give up the additional investment income. That the rate approval process is not intended to guarantee a fair and reasonable rate of return for each insurer was emphasized in the 1984 NAIC study (page 24). It was also stated in the Hope Natural Gas Case (320 U.S. 591, 603).

Table 1 shows the historical rate of return for the period 1977 to 1990, which covers a complete underwriting cycle. The rate of return is defined in terms of dS/S, defined above, using data from A. M. Best and Co. Table 1 shows that:

(1) the industry paid dividends to stockholders each year, and
(2) the industry attracted capital (paid-in surplus) each year, even in 1984 when the industry lost money.

From this we can draw the conclusion that during this time period the U. S. insurance industry earned at least a fair and reasonable rate of return. While it is true that the actual return ranged from -3.1% to 23.5%, the perception existed that a fair and reasonable rate of return was obtainable.

Table 1
Historical Rate of Return for the Property/Casualty Insurance Industry
(in billion dollars, unless a %)

	1977	1978	1979	1980	1981
1. Beginning surplus (S)	$24.7b	$29.4b	$35.5b	$42.5b	$51.0b
2. Ending surplus	29.4	35.5	42.5	51.0	54.0
3. Increase in surplus	4.7	6.1	7.0	8.5	3.0
4. Stockholder dividends	1.1	1.4	1.8	2.2	2.4
5. Surplus paid-in	1.0	.6	.6	.7	.6
6. Surplus change (dS)	4.8	6.9	8.2	10.0	4.8
7. Rate of return (dS/S)	19.4%	23.5%	23.1%	23.5%	9.4%

	1982	1983	1984	1985	1986
1. Beginning surplus (S)	$54.0b	$61.0b	$65.4b	$63.7b	$76.4b
2. Ending surplus	61.0	65.4	63.7	76.4	94.8
3. Increase in surplus	7.0	4.4	-1.7	12.7	18.4
4. Stockholders dividends	2.7	3.0	2.5	2.7	2.8
5. Surplus paid-in	1.5	1.1	2.8	7.7	6.8
6. Surplus change (dS)	8.2	6.3	-2.0	7.7	14.4
7. Rate of return (dS/S)	15.2%	10.3%	-3.1%	12.1%	18.8%

	1987	1988	1989	1990
1. Beginning surplus (S)	$94.8b	$105.0b	$117.9b	$134.9b
2. Ending surplus	105.0	117.9	134.9	138.4
3. Increase in surplus	10.2	12.9	17.0	3.5
4. Stockholder dividends	4.4	4.9	5.5	5.6
5. Surplus paid-in	4.0	1.7	2.4	3.4
6. Surplus change (dS)	10.6	16.1	20.1	5.7
7. Rate of return (dS/S)	11.2%	15.3%	17.0%	4.2%

Note: line (6) = line (3) + line (4) - line (5)

Source: A.M. Best & Co., Aggregates & Averages, respective years.

Table 2 shows the historical values for the industry surplus, premiums, and reserves in nominal amounts and adjusted for inflation. After adjusting for inflation, Table 2 shows that surplus, premiums and reserves have each been increasing annually in deflated terms. This growth represents the growth in the demand for insurance and the growth in the need for surplus to support the growth in reserves of the insurance business. Note that the ratio of reserves to premiums has increased from .80 to 1.33, reflecting the increasing importance of workers' compensation insurance and liability insurance. This has caused the premium to surplus ratio to decline over the years, as surplus has increased to support the increase in reserves.

From 1975 to 1990, the industry appears to have tried to maintain a level reserve to surplus ratio of around 2.00, but this constancy is only a coincidence, since the theoretical risk-based reserve to surplus ratio varies significantly by line of insurance and the mix of lines of insurance changes over time. In fact, this ratio varies significantly by individual insurers.

The insurance industry is very unusual among industries in that about 35% of the business is conducted by mutual insurers, owned by the policyholders. Unlike stock insurers, mutual insurers cannot raise capital, nor do they pay stockholder dividends. If mutual insurers don't pay stockholder dividends and cannot attract capital, how can the fair and reasonable test be applied to the rates of these insurers? The answer lies as follows.

Table 3 is shown in order to point out an important difference between stock insurers and mutual insurers. In Table 3, stock insurers tend to concentrate on the commercial lines which require larger loss and expense reserves, such as Workers' Compensation and Other Liability. On the other hand, mutual insurers tend to concentrate on the personal lines which require smaller loss and expense reserves, such as Auto Liability and Auto Physical Damage. This follows as a natural consequence of their inability to raise capital: they must take a risk adverse strategy. As another conservative approach, mutual insurers pay higher policyholder dividends than stock insurers do. This is conservative because policyholder dividends act as a cushion against adversely high losses, since they aren't paid if the losses are high. Mutual insurers pay higher policyholder dividends because of this conservatism, not as a substitute for stockholder dividends. Both stock and mutual insurers treat policyholder dividends like an expense item in determining net income, so policyholder dividends do not come out of surplus as stockholder dividends do.

Table 2
Inflation Adjusted Times Series and Ratios

	Value of $ vs 1967	Policyholders' Surplus Actual	Policyholders' Surplus in 1967 $	Net Premiums Written Actual	Net Premiums Written in 1967 $	Loss & Expense Reserves Actual	Loss & Expense Reserves in 1967 $	Ratio Premiums to Surplus	Ratio Reserves to Premiums	Ratio Reserves to Surplus
1975	.62	19,712	12,228	49,605	30,772	39,513	24,512	2.51	.80	2.00
1976	.59	24,631	14,446	60,439	35,448	47,105	27,628	2.45	.78	1.91
1977	.55	29,300	16,143	72,406	39,893	56,970	31,388	2.47	.79	1.94
1978	.51	35,379	18,106	81,699	41,811	68,767	35,193	2.31	.84	1.94
1979	.46	42,395	19,501	90,169	41,476	81,113	37,310	2.13	.90	1.91
1980	.41	52,174	21,140	95,702	38,777	92,493	37,477	1.83	.97	1.77
1981	.37	53,805	19,752	99,373	36,480	102,422	37,600	1.85	1.03	1.90
1982	.35	60,395	20,891	104,038	35,987	111,959	38,727	1.72	1.08	1.85
1983	.34	65,606	21,986	109,247	36,611	122,715	41,124	1.67	1.12	1.87
1984	.32	63,809	20,511	118,591	38,120	134,926	43,371	1.86	1.14	2.11
1985	.31	75,511	23,436	144,860	44,960	154,425	47,928	1.92	1.07	2.05
1986	.30	94,288	28,720	176,993	53,912	184,577	56,222	1.88	1.04	1.96
1987	.29	103,996	30,551	193,689	56,900	217,646	63,938	1.86	1.12	2.09
1988	.28	118,195	33,370	202,285	57,110	241,692	68,236	1.71	1.19	2.04
1989	.27	133,972	36,092	208,834	56,259	269,294	72,547	1.56	1.29	2.01
1990	.26	138,401	35,370	218,100	55,737	289,878	74,081	1.58	1.33	2.09
Annual Change	6.0%	13.9%	7.3%	10.3%	4.0%	14.2%	7.7%			

Source: 1991 Best's Aggregates and Averages, page 122, consolidated figures.

Table 3
Percent Comparison of Lines Written - 1989

Lines	Stock Insurers	Mutual Insurers
Workers' Compensation	14.87%	12.61%
Commercial multi-peril	10.24%	4.55%
Other Liability	11.17%	4.28%
Auto Liability	22.24%	35.35%
Auto Physical Damage	13.55%	22.95%
Other Lines	27.93%	20.26%
Total	100.00%	100.00%

Source: 1990 Best's Aggregates and Averages, pages 125-127.

Table 4
Stock vs. Mutual Insurers
(in billion dollars, unless a %)

Stock Insurers	1988		1989		1990	
(1) Beginning surplus (S)	$63.85b	100.0%	$72.46b	100.0%	$83.62b	100.0%
(2) Ending surplus	72.08		82.42		85.99	
(3) Increase in surplus	8.23	12.9%	9.96	13.7%	2.37	2.8%
(4) Stockholder dividends	4.85	7.6%	5.52	7.6%	5.66	6.8%
(5) Surplus paid-in	1.77	2.8%	2.28	3.1%	3.17	3.8%
(6) Return on surplus (dS)	11.31	17.7%	13.20	18.2%	4.86	5.8%
(7) Number of insurers	593		725		755	

Mutual Insurers	1988		1989		1990	
(1) Beginning surplus (S)	$35.17b	100.0%	$38.45b	100.0%	$43.19b	100.0%
(2) Ending surplus	39.13		43.44		43.95	
(3) Increase in surplus	3.96	11.3%	4.99	13.0%	.76	1.8%
(4) Stockholder dividends	0.00		0.00		0.00	
(5) Surplus paid-in	0.00		0.00		0.00	
(6) Return on surplus (dS)	3.96	11.3%	4.99	13.0%	.76	1.8%
(7) Number of insurers	301		409		439	

Note: (6) = (3) + (4) - (5)

Source: A.M.Best & Co., Aggregates and Averages, 1989-1991.

Any insurance enterprise must make enough money and increase surplus enough this year to support the insurance enterprise the following year. Since any increased risk must be supported by additional surplus, the profit provision (and any new capital) must provide for future:

(1) expense and claims inflation
(2) increase in the aggregate reserves
(3) increase in the demand for insurance
(4) dividends to stockholders

In general economic terms, surplus must increase each year in order to support the business next year in terms of projected inflation and new business, as required by the first three items. For a stock insurer, the profit provision must provide a sufficient return to pay stockholder dividends and a return on capital sufficient to attract additional capital to fund the increase in reserves and inflation for current business and the increase in demand for new business.

This brings us back to the question of determining the fair and reasonable rate of return for mutual insurers. Mutual insurers need only increase surplus enough to fund the increase in reserves, inflation, and demand for insurance. The profit provision must provide for this increase in surplus. Since no consideration is required for a return on capital or stockholder dividends, the rate of return analysis for mutual insurers is much simpler than for stock insurers. This comparison is shown in Table 5.

Table 5 shows the approximate rate of return components which mutual and stock insurers needed in 1989 and 1990. Table 5 also shows where the need for the rate of return (dS/S) arises. Back in Table 4, for 1989, it is shown that stock insurers earned 18.2% rate of return on surplus, and mutual insurers earned 13.0%. The rates of return for 1990 are also shown. Table 5 is a breakdown of these rates of return, using information obtained from the A. M. Best time series in Table 2. The inclusion of State Farm Mutual Automobile Insurance Company does not distort Table 5 nor affect the conclusions.

Table 5
Rate of Return Components - 1989 & 1990
(as a percent of surplus (S))

	1989		1990	
	Stock Insurers	Mutual Insurers	Stock Insurers	Mutual Insurers
Required surplus change:				
(1) Expense and claims inflation	6.0%	5.3%	4.0%	3.0%
(2) Increase in demand for insurance	4.0%	4.0%	3.0%	3.0%
(3) Increase in reserves	3.7%	3.7%	3.2%	3.2%
Total	13.7%	13.0%	10.2%	9.2%
Actual surplus change:				
(4) Retained return on capital	10.6%	13.0%	-1.0%	1.8%
(5) Surplus paid-in	3.1%	0.0%	3.8%	0.0%
Total	13.7%	13.0%	2.8%	1.8%
Required rate of return (dS/S):				
(6) Required surplus change(+)	13.7%	13.0%	10.2%	9.2%
(7) Stockholder dividends(+)	7.6%	0.0%	6.8%	0.0%
(8) Surplus paid-in(-)	3.1%	0.0%	3.8%	0.0%
Total (dS/S)	18.2%	13.0%	13.2%	9.2%
Actual rate of return (dS/S):				
(9) Stockholder dividends	7.6%	0.0%	6.8%	0.0%
(10) Retained return of capital	10.6%	13.0%	-1.0%	1.8%
Total (dS/S)	18.2%	13.0%	5.8%	1.8%

Source: based on data from Tables 2 and 4.

Comments on Table 5:

(1) If the shares of a stock insurer are selling for twice "book value" or surplus per share, then the 1989 dividend yield on the stock would be 7.6%/2 = 3.8% and the total return per share at market value would be 18.2%/2 = 9.1% (or a price/earnings ratio of 11.0). This is the way to compare insurance companies and non-insurance companies. In other words, you need to know the ratio of market value to book value.

(2) The general inflation rate in the United States was about 6.0% on claims for 1989 policies, in which the inflation rate was about 4.0% for non-medical claims and 8% for medical claims (source: CPI Detailed Report, Bureau of Labor Statistics). The rate of inflation has been declining for policies written in 1990. Different lines of insurance have different inflation rates, particularly property versus medical or liability, and therefore different required rates of return. Since mutuals write more property business than stock insurers do, a lower inflation rate was assumed for mutuals.

(3) The demand for insurance coverage increases each year as the population increases and as the desire to protect property and business increases. The surplus of the industry must expand to support this additional demand for insurance. An estimate of the long term growth in this demand is given by the average annual increase in net premiums written (deflated), which is shown to be 4.0% in Table 2. Since there is some evidence of a declining rate, 3.0% was assumed for 1990 policies.

(4) Table 2 also shows that the loss and expense reserves have been growing faster than net written premiums, due mainly to increased litigation, increased delay in resolving disputes, and increased demand for the liability coverages. The average annual increase in the deflated reserves was 7.7%, less 4.0% for the increasing demand for insurance leaves 3.7% for the annual increase in reserves. This increase each year must be supported by a proportional increase in surplus. Slightly lower figures were assumed for 1990.

(5) For stock insurers, Table 4 shows that, for 1989, surplus paid-in was $2.28 billion or 3.1% of beginning surplus. The actual surplus change was $9.96 billion, or 13.7% of beginning surplus, which implies that the retained return on capital must have been 10.6% (13.7%-3.1%). For 1990, the retained return on capital was actually negative.

(6) The rate of return in 1989 for mutual insurers of 13.0% was just exactly the right amount required to cover inflation and the increase in surplus necessary to support the increase in demand for insurance and the increase in reserves. For 1990, the actual rate of return fell far short of the required amount.

(7) Stock insurers can obtain the surplus required to support inflation, the additional new business, and the increase in reserves by attracting new capital, as well as from increased retained earnings. They needed 13.7% (6.0% + 4.0% + 3.7%) in 1989 and did this with 3.1% from capital paid-in and 10.6% from retained return on capital to give 13.7%, which in 1989 was the amount required, but stock insurers did not meet the required level in 1990, a very poor year for the industry. To attract and retain this capital, the stock insurers paid 7.6% back in stockholder dividends in 1989 and 6.8% in 1990.

The point of Table 5 is to show that even though the profit provisions for stock insurers and mutuals are different, the profit provisions, and therefore the fair and reasonable rate of return, can be determined by examining the actuarial and financial economics of the business of insurance. It also shows that a fair and reasonable rate of return may vary by type of insurer, depending on stock or mutual, and even by the lines

of business which the insurer writes.

If stock insurers require a higher rate of return, how can they compete against mutual insurers? The answer lies in market segmentation as seen in Table 3, where it is shown that mutual insurers focus on the lower risk personal lines, while stock insurers focus on the higher risk commercial lines.

What if a stock insurer suddenly wanted to increase its annual growth rate to a 20% annual rate, shouldn't the rate of return to stockholders remain the same? The answer is yes. In Table 5, if the 4.0% increase in demand became 20%, then the required surplus change would be 29.7%. This could be met by increasing the surplus paid in from 3.1% to 19.1% by selling shares of stock. The rate of return to each stockholder on a per share basis would not need to change. Mutual insurers probably could not grow 20%, because their rate of return would have to increase to 29.0% to fund the growth, and this could only be accomplished by premium rate increases.

If the investor is only receiving 7.6% in dividends on surplus and probably much less on a market value basis, why is the investor investing in the risks of the insurance business? The investor is actually receiving 7.6% in cash dividends and 10.6% in growth in value of the stock, for a total of 18.2% (which will be much less on a market value basis). If the insurance surplus needs stop growing, then the retained return on capital would drop and the dividends to stockholders would rise. The dividends to stockholders, the retained return on capital, and the surplus paid-in are all continually adjusting to maintain the competitive equilibrium rate of return.

Perhaps the most common method advanced by economists at the Proposition 103 hearings for determining the proper rate of return was a method based on a discounted cost flow (DCF) model. The numerical results of these models give a rate of return in the 16-18% range for publicly traded stock insurers, in agreement with Tables 1, 4 and 5. Since the models are formulated in terms of an annual change in the investment of investors, the resulting rate of return is actually equivalent to **dS/S**. Furthermore, most models include an estimate of the growth in earnings per share, which is equivalent to recognizing that some return on capital is being retained for the increase in demand for insurance. However, these models do not include all of the dynamics of the insurance industry, nor do they explain the rate of return requirements for mutual insurers.

It has now been shown that the proper measure of the required rate of return is **dS/S**, which will vary

between stock and mutual insurers and vary depending on inflation, interest rates, the national economic cycles, underwriting cycles, catastrophes, and the dynamics of the insurance business.

MUTUAL INSURERS

Mutual insurers must be considered separately from stock insurers in any analysis of rate of return. The term "mutual insurers" refers to a diverse group of insurance organizations which includes reciprocals, risk retention groups, and Lloyds organizations. State Farm Mutual Automobile Insurance Company alone makes up about 40% of the aggregate financials of the mutual insurers. The typical mutual insurer is an insurer which was created out of a market crisis and provides insurance coverage to an affinity group of insureds, usually medical professionals, hospitals, farm organizations, or industries with unusual liability exposures. Mutuals may also arise as an adjunct to a non-profit organization, such as an automobile club. Unlike a stock insurer, the primary goal may not be profit maximization, but to provide availability of a particular coverage and survival in an unwanted market. The underwriting standards may be looser and a greater reliance is placed on policyholder dividends, particularly when a proper premium rate is very difficult to determine initially. The analysis in the preceding section provides a basis for testing the reasonableness of the profitability. Other tests would include the expense ratios and the loss ratios as compared with other insurers writing that line.

The A. M. Best Company did a study of 372 property/casualty insolvencies since 1969 and found that stock companies accounted for 75% of all insolvencies while representing only 49% of the industry, and mutual companies accounted for 16% of insolvencies while representing 46% of the industry. The report makes this observation:

> "The disproportionately higher insolvency levels of stock companies can be partially attributed to the kinds of business they underwrite. Stock companies have been more active than mutuals in commercial lines and casualty classes of business which have experienced more volatile underwriting results. In addition, greater demands have been placed on stock company managements to keep capital utilized which has led to higher levels of underwriting leverage for stock versus mutual companies. Higher underwriting leverage, combined with more volatile underwriting exposures, have made stock companies more susceptible to failure.
>
> On the other hand, mutual companies have concentrated more on personal lines and property

classes of business and employed, on average, less underwriting leverage. This more conservative operating philosophy has led to fewer insolvencies."

(A. M. Best & Co., Best's Insolvency Study, June, 1991, p. 32)

The reason that this passage is quoted at length is because it is correct and, yet, not every economist would appear to agree with it. The argument is made that the policyholders are "investors" who are entitled to a rate of return commensurate with the rate of return of other industries. For this comparison, it is argued, the mutual financials should be converted to GAAP financials and compared with national stock market returns. Another argument is that the price a particular consumer pays should be the same irrespective of the legal form of the insurer and therefore the same economic analysis should be applied to both mutuals and stocks.

The problem is that reality doesn't quite fit the logic. The new mutual policyholder didn't put in any surplus and doesn't have the right to take out any portion of the surplus. Furthermore, a stock and a mutual insurer can charge the same rate for the same coverage and still have, quite rightly, different rates of return. Also, the mutual insurer can charge a lower rate than the stock insurer and still not write all of the business. This last situation is quite common in workers compensation and private passenger automobile insurance. Why this is so common is not well understood, but is believed to be possible because of perceived product differentiation in terms of agent service and claims service and also risk differentiation on the part of the insurer.

As an aside, the above passage also helps explain why uniform leverage ratios are not realistic.

STOCK INSURERS: BOOK VS. MARKET VALUE

Preceding sections have shown that the required rate of return for mutuals depends only on the prospective inflation rate of the claims which are expected to occur under the coverages being written, the relative growth in reserves and other liabilities, and the expected growth in exposures. This analysis can be applied to an individual mutual insurer as well as all mutual insurers combined as an industry. The analysis for mutual insurers is considerably simpler than the analysis necessary to determine the required rate of return for stock insurers. Even though all of the considerations which apply to mutuals apply to stock insurers, the existence of the stockholders adds another dimension. The analysis of a fair and

reasonable rate of return for stock insurers should only be applied to the industry as a whole. The tests which involve attraction of capital and comparison with other industries are tests which are not well suited to the examination of the rate of return for an individual, multi-line stock insurer (even though the tests can be applicable to a large public utility with one homogeneous product). However, it turns out that we do have a means of examining the rate of return for individual stock insurers, and that involves looking at the ratio of market to book value of the stock.

The ratio of market to book value (that is, the ratio of the market price per share to the amount of surplus per share) is obviously a critical link in the analysis. The analysis given so far has been in terms of the rate of return on book value, but the return which the investor/stockholder actually sees is the rate of return on the market value of the stock. Despite the apparent importance of market to book value, it is seldom reported in the financial news, and there are hardly any research papers on the subject. Basically, the reason for this is that financial economists don't trust book value statistics, because in some industries it is easy to inflate assets far above the resale value and to include such intangibles as "good will" and the value of brand names, and there is a preference among most investors to look at the price/earnings ratio instead. The market to book value ratio is most often considered in connection with a purchase or merger of a company.

Table 6 shows the rate of return statistics for 13 leading property/casualty insurance groups. All of the statistics are from special issues of Business Week, which obtained the data from Standard & Poor's Corp., so the data would be on a GAAP accounting basis. The table shows the ratio of market value (price) to book value (which is the sum of common stock, capital surplus, and retained earnings). The past and estimated earnings per share are shown to indicate the company's financial performance. The price/earnings ratio is shown for reference, since this is also a measure of investor confidence in the company. The actual return on market value and return on book value are also shown. The ratio of these figures should equal the market value to book value ratio. The return on book value is approximately the rate of return (dS/S) which has been discussed in this paper and is the rate of return to the insurer and is also a measure of past performance, since it indicates whether or not the insurer is earning the required rate of return. The rate of return on market value is the rate of return which the investor is demanding in order to invest in the company. The overall ratios for all of the industrial and financial companies which make up the Business Week 1000 are shown at the bottom of the table. However, the ratios for individual industrial and financial companies vary widely.

Table 6
Stock Insurers: Market Value to Book Value Ratio Analysis

Stock Insurer		Market to Book Value	Earnings per Share 1989	1990	1991E	P/E Ratio	Return on Book	Return on Market
Group 1: good performance/good future								
American International Group	1990	2.08	$6.63	$6.92	$7.29E	14	15.0%	7.3%
	1989	1.95	6.63	6.74E		11	17.0	8.8
General Reinsurance	1990	2.71	6.52	6.89	7.05E	14	19.4	7.3
	1989	2.47	6.52	6.64E		13	19.4	7.9
Chubb	1990	1.97	4.92	6.07	5.86E	11	18.1	9.2
	1989	1.64	4.92	4.74E		10	16.2	9.9
Progressive	1990	3.43	2.93	3.84	4.79E	16	22.9	6.7
	1989	1.92	2.93	3.80E		12	16.7	8.7
Cincinnati Financial	1990	1.79	7.00	7.83	8.64E	13	14.1	7.7
	1989	1.20	7.00	8.19E		11	11.2	9.4
GEICO	1990	2.95	13.74	13.64	12.04E	13	23.0	7.8
	1989	2.42	13.74	10.36E		10	23.7	9.8
Group 2: good performance/uncertain future								
St. Paul	1990	1.34	8.13	8.56	7.97E	8	18.3	13.9
	1989	1.29	8.13	6.73E		6	16.9	13.1
Safeco	1990	1.31	4.75	4.41	4.13E	9	14.8	11.3
	1989	1.29	4.75	4.16E		8	16.6	12.9
20th Century	1990	1.99	3.55	3.85	3.36E	9	26.9	13.5
	1989	1.99	3.55	na		7	30.3	15.2
Group 3: weak performance/uncertain future								
Aetna Life & Casualty	1990	.72	5.69	5.52	6.06E	8	8.8	12.3
	1989	.82	5.69	5.45E		9	9.2	11.3
CIGNA	1990	.69	5.68	4.20	5.28E	12	6.2	9.1
	1989	.75	5.68	4.89E		9	8.3	11.4
Travelers	1990	.55	4.07	-1.85	3.22E	-	-4.6	-7.7
	1989	.73	4.07	3.72E		8	8.8	12.0
USF&G	1990	.57	1.21	-5.71	0.22E	-	-33.5	-57.1
	1989	1.39	1.21	1.83E		25	5.6	4.6
Business Week 1000	1990	2.12	2.39	2.62	2.83E	18	12.5	5.9
	1989	1.91	2.39	2.63E		16	13.2	6.9

Source: Business Week, Special Issues, 1991, 1990.

The 13 insurers in the table have been placed in three groups by common investor and financial characteristics. The three groups have these distinctive characteristics:

Group 1: Good performance/good future

(1) market/book ratios near or greater than 2.0

(2) strong or stronger than expected earnings growth

(3) high P/E ratios

(4) required rate of return on book value achieved; ordinary return on market value

Group 2: Good performance/uncertain future

(1) market/book ratios between 1.0 and 2.0

(2) required rate of return on book value being achieved, but lower future earnings expected

(3) low P/E ratios

(4) high return on market value to compensate for the earnings uncertainty in the future

Group 3: Weak performance/uncertain future

(1) market/book ratios below 1.0

(2) future earnings may be uncertain; past performance weak or inconsistent; not achieving the required rate of return on book value to sustain future business

(3) low P/E ratios

(4) investors perceive potential problems and discount market price below book for this uncertainty and to achieve a higher rate of return

Table 6 is intended to show that for stock insurers, the stock market will price the stock to get the competitive rate of return based on the investor's assessment of the risk/return relationship. All of these companies are publicly traded companies and, therefore, must compete in the open capital market.

How does the concept of fair and reasonable rate of return apply to individual stock insurers? Since the shares of these insurers are publicly traded, the investors are by definition receiving a fair and reasonable rate of return based on the individual insurer's risk/return relationship. But does this mean that the rate of return on book value (dS/S) is fair and reasonable? This is actually the issue from a regulatory perspective and the issue which needs to be argued. On this issue, there are several observations that can be made:

(1) the market to book ratio for the Group 1 insurers was about 2.0, which is the same as the ratio for the Business Week 1000.

(2) the rate of return on book value (dS/S) for the Group 1 insurers is in the range required by the

analysis given in Table 5, namely, in the area of 13-18%.

(3) since stock insurers are competing in the capital marketplace and capital can be added (paid-in) or withdrawn (dividends), economic theory would argue that the rate of return on capital (S) must be the competitive equilibrium rate of return.

CONCLUSION

The objective of this paper was to show an analysis of surplus and rate of return on surplus without using leverage ratios. A number of conclusions were made:

(1) Modern risk theory has shown that the optimum surplus, once determined, can not be subdivided and that premium to surplus ratios (leverage ratios) do not exist which can be applied generally to all insurers.

(2) The proper measure of income for determining profitability is the change in surplus adjusted for dividends and paid-in capital.

(3) The required rate of return for both mutual and stock insurers must include provision for future inflation, increase in demand, and changes in the liabilities, particularly increases in the aggregate loss and expense reserves.

(4) The rate of return for stock insurers must also include a fair and reasonable rate of return for investors. The rate of return for stock insurers is measured by the rate of return on book value, but the return to the investor is the rate of return on market value. These rates of return are connected by the market value to book value ratio.

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