

Risk/Return Relationships for Life-Health, Property-Liability, and Diversified Insurers

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Abstract

This study focuses on a risk-return comparison for life-health, property-liability, and diversified insurers. Included is an analysis of risk-return relationships using both mean-variance and CAPM approaches. Both accounting and market data are used to measure profitability. The results suggest that for the time period of the study, 1973 through 1987, investment in individual life-health and property-liability insurers was better than investment in diversified insurers. Evidence also indicates that accounting measures of profitability may be poor proxies for market performance.

This study undertakes to compare the mean returns for life-health, property-liability, and diversified insurers. Mean returns are compared both with and without adjustment for risk. Several measures of risk are used and both book and market returns are considered. The goal of the study is to assess whether identifiable risk-return advantages existed for investors in each of the three insurer segments during the period 1973 through 1987.

A number of studies have been published on the topic of insurance company profitability. The Arthur D. Little (1967) report concluded that insurers were not earning excessive profits, especially on a risk-adjusted basis. Forbes (1971) and Trieschmann (1971) came to a similar conclusion. Fairley (1979) used the capital asset pricing model (CAPM) to determine the appropriate rate for automobile insurance. His findings suggested premium rates lower than those desired by insurers. He argued that only systematic risk, as measured in the CAPM, should be considered. However, Harrington (1983), in a study of life-health insurance stocks from 1961 through 1976, found evidence of a significant relationship between mean returns and both systematic and unsystematic risk. Cummins and Harrington (1988) analyzed the risk-return relationship of property-liability insurance stocks during the

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period 1970 through 1983. Their results were inconsistent with CAPM for the time period 1970 through 1980, but were consistent with it for the period 1980 through 1983. Cox and Griepentrog (1988) provided empirical results indicating that both systematic and unsystematic risk are important.

Pritchett and Wilder (1986), in an extensive study of life-health insurers from 1950 through 1980, used mean-variance and CAPM, as well as accounting rate of return data. They concluded that life-health insurers had higher returns and greater volatility from 1950 through 1963 than during the period from 1963 through 1980. The Insurance Services Office (ISO) (1987) conducted a profitability study on the property-liability industry for the period 1970 through 1986. The study focused primarily on book rate of return and total risk. The ISO study concluded that for the time period studied, the property-liability insurance industry earned below average returns and had greater variability of returns than most of the other 89 industries examined.

Research Issues

This study, while considering risk-return issues similar to those investigated by previous studies, differs in several ways. First, the study focuses on a comparison of risk and return for life-health, property-liability, and diversified insurers. A key question is asked: Do investors gain by purchasing the stock of a diversified insurer versus separately buying the stock of a life-health insurer and of a property-liability insurer? Portfolio theory suggests that there would be no return advantage on a risk-adjusted basis. However, if efficiencies result from the combination of life-health and property-liability operations, then a risk-return advantage might be observed. None of the previous risk-return studies focused simultaneously on the three segments of insurers. Therefore, the results of previous studies for life-health and property-liability insurers, since they were conducted over differing time periods, are not directly comparable. In addition, no previous study specifically considered diversified insurers.

Second, the study includes an analysis of risk-return relationships using both the mean-variance and CAPM approaches. Both methods are considered since there continues to be debate over the appropriate measure of risk. Both accounting data and stock data are used to measure profitability, and the relationship between the two measures of return is reviewed. Several different definitions of accounting rate of return are examined. No prior study considered all of these issues.

Third, the market data and risk measures that are used were actually known to investors at the time investment decisions would have been made. The study uses data from Value Line. These investment services data are widely available with Value Line having over 100,000 paid subscribers. Thus, the risk measures and other variables were observable by investors at the time investments were being made rather than calculated a number of years after the fact. The insurers used in the study are divided into the three insurer segments based on

the categorization in Value Line. The database consists of 11 life-health insurers, ten property-liability insurers and nine diversified insurers.¹

Fourth, unlike several of the prior studies, the property-liability underwriting cycle is specifically considered in this study. The underwriting cycle is defined on the basis of the pattern of statutory underwriting gains (losses). Statutory underwriting gains went down in 1973, relative to 1972, turned up in 1975, and reached a peak in 1978. This was the first cycle. Underwriting gains again turned down in 1979, turned up in 1985, and reached a peak in 1987. This was the second cycle. By using time periods that represent complete cycles the study controls for the uneven impact of the property-liability underwriting cycle on profitability and risk.

Finally, although there has been little empirical investigation of the existence of an underwriting cycle for life-health insurers, it seems apparent that their results depend heavily on the pattern of interest rates. The present study includes periods of rising and falling interest rates. Long-term AAA bond rates rose from 7.44 percent in 1973 to 14.17 percent in 1981 and then fell to 9.38 percent in 1987. Six-month T-bill rates rose from 7.04 percent to 14.03 percent and then fell to 6.05 percent. All of the above figures are yearly averages. Also, as a result of this pattern of interest rates, the time period used in this study includes a period in which investors had probably changed their expectations to reflect lower future interest rates. Most of the previous studies included time periods during which interest rates were following an upward trend.

Research Methods

Profitability Measures

The chosen profitability measure for return on equity (book return) is annual after-tax earnings over average stockholders' equity. Although the ISO (1987) study used ending equity, most prior studies have used average equity. The book returns are calculated from generally accepted accounting principles (GAAP) accounting data.² The profitability measure for returns to

¹ Although the number of insurers included in the study is relatively small, notice that S&P, Dow Jones, A.M. Best, and Value Line all use similar stocks in their indexes for the three insurer segments. In addition, the correlation between the book returns for the Value Line property-liability insurers and the book returns for the ISO (1987) property-liability insurers is over 90 percent. This indicates that the sample is reasonably representative of the industry. However, it should be noted that mutual insurers represent a significant portion of the insurance industry. Due to the investor focus of this study the sample is necessarily restricted to stock insurers.

² The particular value of stockholders' equity that is chosen has a significant impact on the level of calculated book returns. In statutory accounting, the stockholders' equity account includes recognition of unrealized gains and losses each year. In contrast, GAAP calls for carrying stock investments at the lower of cost or market if the firm has less than 20 percent control. As a result of regulatory restrictions that limit the percentage of a firm's outstanding stock that an insurer can own, GAAP effectively excludes unrealized gains and losses from the stockholders' equity account. Therefore, in a period of rising common stock prices, statutory accounting data will produce a lower level of book return than data based on GAAP, all other factors constant. Stock prices were

stockholders (market return) that is selected is the annual change in stock price plus any dividends paid divided by the beginning period price. The same profitability measures were used by Pritchett and Wilder (1986). Annual data are used to allow comparison between book and market returns.

Risk Measures

Two approaches are considered for analysis of risk-return relationships of the three insurer segments. The first, often called the mean-variance approach, assumes that investors are risk averse and that they care about total risk. Total risk, both systematic and unsystematic risk, is measured by the standard deviation or coefficient of variation (CV) of returns. The expectation under this approach is that investors will require higher expected returns when risk is greater. Therefore, a positive relation between the mean and standard deviation of returns would be expected. Under the above assumptions, one investment would be considered unambiguously superior to another if it offered higher mean returns with a lower standard deviation of returns.

The second approach is based on the well-known CAPM. According to the CAPM, a regression line should pass through the origin if the returns for the insurer segment, on average, correspond to the returns offered by the market. However, returns in excess of those offered by securities with similar risk would be indicated by a regression line with a positive intercept. The specific model used to estimate excess returns is given by:

$$R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \epsilon_t$$

where R_{it} = return in year t for the i^{th} insurer segment

R_{ft} = one-year Treasury bill rate (risk-free rate)

R_{mt} = return on the market (S&P 500)

β_i = risk of the insurer segment relative to the market

α_i = level of excess returns

ϵ_t = an error term.

Several performance measures related to the CAPM approach described above have been suggested. These include the Jensen Performance Index (α_i), the Treynor Performance Index (α_i/β_i), and the Sharpe Performance Index (α_i/σ_i).³ The last two values yield measures of normalized excess returns, with the first being adjusted for risk relative to the market and the latter being adjusted for total risk.

rising during the period 1973 through 1987. In addition, using ending equity during a period of rising stock prices and equity accounts would generate lower book returns, everything else equal.

³For a discussion of the various performance measures mentioned here, see Jacob and Pettit (1984, pp. 938-41).

Results*Returns to Stockholders*

For the period 1973 through 1987 mean returns to stockholders for all three insurer segments were greater than for the market (S&P 500 index). However, only the life-health insurers and the property-liability insurers had lower total relative variation than the market, as measured by CVs. Diversified insurers had inferior performance relative to the other insurer segments with lower mean returns and higher total variation. Information on returns to stockholders for each insurer segment is presented in Table 1. The mean and standard deviation of annual returns are represented by $\bar{X}$ and σ , respectively. The values for the risk-free rate are equal to the one-year Treasury bill rate.

All three segments had higher mean returns and lower CVs than the market during the period 1973 through 1978. However, for the period 1979 through

Table 1
Returns to Stockholders (Market Returns)

Year	Diversified	Life/Health	Prop/Liab.	S&P 500	Risk-Free Rate
1973	-28.60%	-24.55	-10.67	-15.23	7.01
1974	-39.91	-16.90	-25.87	-26.47	8.00
1975	43.49	12.59	26.82	37.20	5.80
1976	43.36	24.96	31.56	23.84	5.08
1977	9.99	29.83	-7.93	-7.18	5.12
1978	20.65	3.06	24.06	6.56	7.18
1979	27.21	17.37	22.91	18.44	10.38
1980	0.53	-1.46	24.90	32.42	11.24
1981	20.40	20.56	15.87	-4.91	14.71
1982	23.12	30.43	18.43	21.41	10.54
1983	29.50	35.21	27.28	22.51	8.80
1984	4.58	31.05	6.50	6.27	9.85
1985	50.40	30.35	63.79	32.16	7.72
1986	9.24	27.77	10.90	18.47	6.16
1987	-19.78	-20.26	-14.20	5.23	5.47
$\bar{X}$	12.94	13.33	14.29	11.38	8.20
σ	26.46	20.46	22.34	18.63	2.73
CV	2.04	1.53	1.56	1.64	.33
1973-78					
$\bar{X}$	8.16	4.83	6.33	3.12	6.37
σ	35.53	22.04	24.04	24.17	1.10
CV	4.35	4.56	3.80	7.75	.17
1979-87					
$\bar{X}$	16.13	19.00	19.60	16.89	9.43
σ	20.18	18.40	20.78	12.53	2.65
CV	1.25	.97	1.06	.74	.28

1987 life-health insurers and property-liability insurers had higher mean returns, but only at the expense of higher CVs than the market.

An interesting result is the fact that the mean returns to stockholders for property-liability insurers were very highly correlated with the market, while the returns for diversified and life-health insurers had lower correlation. This may result from the fact that property-liability insurers invest a relatively greater share of their assets in the stock market than do insurers in the other segments.

Excess Returns to Stockholders

Applying the CAPM approach described above produced the following results. The values for mean returns, $\bar{R}_j$, and the estimated values for α , β , α/β and α/σ are presented in Table 2. The estimated value for α represents the level of excess returns for an equally weighted investment in stock in a particular insurer segment relative to the expected return based on the segment's level of market risk. The values for α/β adjust the estimates of excess returns to account for the level of systematic risk and the values of α/σ adjust the estimates of excess returns for the level of total risk.

Table 2
Risk-Adjusted Returns to Stockholders

Measure	Diversified	Life/Health	Prop/Liab	S&P 500
$\bar{R}_j$	12.94	13.33	14.29	11.38
β	1.08	.52	.95	1.00
Jensen (α)	1.31	3.47	3.07	0.00
Treynor (α/β)	1.21	6.67	3.23	0.00
Sharpe (α/σ)	.0495	.1696	.1374	0.00

The values in Table 2 suggest that when adjusted by different measures of risk, life-health and property-liability insurers still provide better performance relative to diversified insurers over the time period 1973 through 1987.⁴ The positive values of α are consistent with the findings of previous research (see Harrington, 1983; Pritchett and Wilder, 1986; Cummins and Harrington, 1988). However, the hypothesis of α equal to zero cannot be rejected for any of the insurer segments. Pritchett and Wilder (1986) had a similar finding in their study of life-health insurers.⁵

⁴CAPM models for the single-cycle periods (1973 through 1978 and 1979 through 1987) were also estimated. The values of β were similar on a relative basis to those estimated over the two-cycle period. The estimates of excess returns were all positive for both single-cycle periods. However, diversified insurers did have larger excess returns than the other insurer segments during the period 1973 through 1978.

⁵The analyses of market returns were also performed using the A.M. Best Insurance Stock Indexes. These include the Life/Health, Property/Casualty and Multiple Lines Indexes. The numerical results were similar and the rankings were the same as those found using the Value Line data.

The finding of greater returns for life-health and property-liability insurers relative to diversified insurers may to some extent be explained by diseconomies of scale or scope. Comparison of the insurer segments on the basis of assets indicates that the diversified insurers tend to be much larger than the life-health and property-liability insurers. The average value of assets for the diversified insurers was five times greater than for the other two insurer segments. The larger diversified insurers may simply be unable to efficiently manage combined life-health and property-liability insurance operations.⁶

Book Returns v. Market Returns

The correlation between market returns and book returns for the diversified insurers and for the life-health insurers was negative but nonsignificant. The correlation between market and book returns for the property-liability insurers was positive but nonsignificant. Also of interest is the fact that although the level of mean returns over the period were similar, the standard deviations of book returns were much lower than the corresponding standard deviations of market returns. Information on book returns for the three insurer segments is presented in Table 3.

Table 3
Returns on Equity (Book Returns)

Year	Diversified	Life/Health	Prop/Liab
1973	14.38%	14.85	12.12
1974	27.58	14.13	8.37
1975	10.38	14.01	10.01
1976	11.62	14.68	14.79
1977	13.19	15.10	21.33
1978	20.13	15.49	23.82
1979	18.91	15.88	19.53
1980	14.81	13.54	16.04
1981	13.70	11.92	14.92
1982	11.95	10.64	9.47
1983	11.18	11.79	9.10
1984	6.95	12.20	7.98
1985	11.18	12.78	12.18
1986	11.61	12.38	20.98
1987	10.72	10.97	15.93
$\bar{X}$	13.89	13.36	14.44
α	5.02	1.67	5.15
CV	.36	.13	.36

⁶Studies by Praetz (1980) and Doherty (1981) have found some evidence of scale economies for life-health and property-liability insurers. However, there appears to be no prior study related to economies of scope for combinations of life-health and property-liability operations.

The low level of correlation between market and book returns suggests that studies of profitability would be ill-advised to rely on book returns as a proxy for market returns. In addition, the much lower variation in book returns compared to the variation in market returns seems to indicate that insurance accounting practices may smooth out reported returns. An example of such practices would include under and over-estimating of loss reserves by property-liability insurers. Such activity has been suggested in a number of prior studies.

Summary

This study focuses on a comparison of risk-return relationships for life-health, property-liability, and diversified insurers. Analysis is performed using both the mean-variance and CAPM approaches. Both accounting and market data are used to measure profitability.

The results suggest that for the time period of the study investment in individual life-health and property-liability insurers was better than investment in diversified insurers. This finding may to some extent result from the inability of the larger diversified insurers to operate as efficiently as the smaller life-health and property-liability insurers. All three insurer segments produced positive excess returns relative to the market during the time period 1973 through 1987. Evidence also indicates that annual accounting measures of profitability are imperfect proxies for market performance due to the low correlation between these measures.

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