

NOTES AND COMMUNICATIONS

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

Donald W. Hardigree

Ronald F. Anderson

In an article in this journal, Hoyt and Trieschmann (1991) investigated mean returns for life-health, property-liability, and diversified insurers. Their stated goal was the assessment of whether identifiable risk-return advantages existed for investors in each of the three insurer segments during the period 1973 through 1987. Although their goal is appropriate and their study expands the focus of previous risk-return analyses, it suffers from a basic methodological fault, making the results and conclusions questionable.

Focus of the Hoyt-Trieschmann Study

According to Hoyt and Trieschmann, their study differs from previous risk-return investigations in several ways. Their study focuses upon a comparison of risk and return for all three segments of the insurance industry: life-health, property-liability, and diversified insurers.¹ Their analysis addresses whether investors gained by purchasing the stock of a diversified insurer rather than separately buying the stock of a life-health insurer and a property-liability insurer. By simultaneously examining all three segments of the insurance market over a similar time period, Hoyt and Trieschmann broadened the scope of previous risk-return examinations. Hoyt and Trieschmann's study examines risk-return issues, applying both the capital asset pricing model and mean-variance approaches, and uses both accounting and stock data. Because they use Value Line data, the market data and the risk measures they used were

Donald W. Hardigree is Director of the Institute for Insurance and Risk Management at the University of Nevada, Las Vegas. Ronald F. Anderson is Assistant Professor in the Department of Finance at the University of Nevada, Las Vegas.

¹ The term diversified insurer was not defined. One can surmise—from HT's question, "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?"—that the term refers to insurers offering both property-liability and life-health products, but an explicit definition would have been useful.

known by investors. Finally, the Hoyt-Trieschmann analysis incorporates the underwriting cycle for property liability insurers and "periods of rising and falling interest rates," a type of underwriting cycle proxy for life-health insurers, by using time periods that represent complete cycles.

Weaknesses

Inferences Not Valid

The problems with Hoyt and Trieschmann's study arise from an abuse of the sampling process in making inferences about the population of insurers. Hoyt and Trieschmann's analysis of risk-return relationships for life-health, property-liability, and diversified insurers is based upon inadequate sample sizes (eleven life-health insurers, ten property-liability insurers, and nine diversified insurers). Their conclusions regarding the industry segments are speculative, since convenience in data collection seemingly outweighed unbiased and accurate scientific inquiry. Unfortunately, this small sample problem is not unique to Hoyt and Trieschmann. As Cox and Griepentrog (1988, p. 614) stated in this journal:

[Hill and Modigliani] cogently demonstrate the data limitation problems related to P-L insurer market returns when they cite their ten-firm sample of monthly returns for the 1967-1980 period as having "exhausted the possibilities of using data from financial markets to infer the risk of underwriting."

One should not cast aside the steps in the sampling process necessary for accuracy of measurement and the ability to generalize the results to a larger population simply because the data are not readily available. Hoyt and Trieschmann (p. 324) acknowledge that the samples are small: "Although the number of insurers included in the study is relatively small, notice that Standard & Poor's, Dow Jones, A. M. Best, and Value Line all use similar stocks in their indexes for the three insurer segments." Such an explanation is inadequate and akin to the argument, "All of the other kids do it." In a published academic analysis, one expects an unbiased approach based upon the necessary requirements of the methodology employed. Researchers should not force through a method or model because of data constraints. Although insurance researchers are often tempted to utilize "mainstream" finance approaches, one must remember that financial return data are quite limited because of the confounded ownership of many stock insurers and the mutual form of ownership. There are not enough insurers for which share price or return data are available to make inferences about the overall insurer population.

Generalizability, Bias, and Ownership

Hoyt and Trieschmann attempted to follow the precepts of modern statistics in making inferences about three segments of the insurance industry based on information gathered from small samples of each segment. However, an obligation exists to abide by the rules of basic sampling theory. At a minimum,

two criteria must be satisfied: The sample size must be of sufficient size to permit inferences to be made about the population, and the sample must be representative of the population if the inferences are to be valid and generalizable. In fact, both criteria must be satisfied for one to draw inferences about members of the population not included in the sample.

Hoyt and Trieschmann's sample was made up of life-health, property-liability, and diversified insurers for whom data were reported in Value Line for each of the three insurer populations. As Warwick and Lininger (1975, p. 8) note, "It is essential to know if the sample group itself is representative of the population about which conclusions are sought." Unfortunately, Hoyt and Trieschmann's study did not comply with this requirement. For example, mutual insurers, a substantial segment of the insurance industry in each of the three populations addressed, are not represented in the sample. Hoyt and Trieschmann (p. 324) acknowledge this omission in a footnote, stating 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." This fact is not represented in the abstract or in the body of the article. The authors should define the population and its size in the body of the article.

Since the Hoyt-Trieschmann study does not provide information about mutual insurers, one wonders if the sample utilized in the study was representative of the stock insurer populations for each of the three segments investigated. No information on this question is provided in the article. Bias is suspected because there was no element of randomness in the selection process. For example, is there a difference in risk-return comparisons for different size insurers? That is, are economies of scale present? And, if so, does the convenience sample used contain companies of different sizes?

Another concern pertains to ownership. Do "stand alone" companies' data encompass characteristics of insurers whose ownership is confounded? The reader is unable to judge the validity of the conclusions from the information presented in the article. Since the sample is small, perhaps Hoyt and Trieschmann should have provided a list of the insurers in each of the three insurer categories to allow readers to draw their own conclusions about whether the sample was representative of the population.

Small Sample Size

The property-liability segment of the industry was made up of about 3,900 insurers in early 1990 (*Fact Book: 1991 Property/Casualty Insurance Facts*, 1991). In 1989, 2,350 U.S. life insurers existed (*1990 Life Insurance Fact Book*, 1990). Of these over 6,200 insurers, many are considered diversified insurers, but the number is questionable. Although many of these insurers are grouped together under common ownership, even after allowing for grouping, a large number of independent insurance organizations remain. For example, there are about 1,200 independent operating entities in the property-liability insurance industry. Can reliable inferences be made about such large popula-

tions of insurers,² with sample sizes of eleven, ten, and nine? Various textbooks offer formulas for calculating necessary sample size. For example, Cochran (1963, p. 76) provides a basic method for determining sample size:

$$n_0 = \frac{z^2 s^2}{d^2},$$

where z = the z table value associated with the required level of confidence,³
 s = the sample standard deviation (hence, squared it is the sample variance), and
 d = the amount of error tolerated by the researcher.

Using the above formulation, one can assume reasonable values for z and d and determine the required sample size. For example, based upon the data in Table 3 of Hoyt and Trieschmann's article, a 95 percent level of confidence and a tolerable error of magnitude would require a random sample of about 95 diversified insurers and over 100 property-liability insurers.

Hoyt and Trieschmann suggest that their sample is representative by stating that "the correlation between book returns for the Value Line property-liability insurers and the book returns for the [Insurance Services Office] (1987) property-liability insurers is over 90 percent." Correlation reveals and measures relationships but does not prove representativeness or causal relationships, not even in cases of perfect positive correlation. In addition, a relationship between book returns does not imply that there is also a relationship between market returns for the same insurers. Hoyt and Trieschmann (p. 329) recognize that "accounting practices may smooth out reported returns." If this is an industry-wide practice, it should be no surprise that there is a high correlation between the two series.

Results Are Not Generalizable

Although it is tempting to analyze the insurance industry in the same fashion as other industries, one cannot overlook significant potential problems associated with such an analysis. Researchers in the insurance field are hampered by the lack of available market-value financial data. Unconfounded financial data are difficult and expensive to secure. The common sources of such information for the noninsurance industry—Value Line and Center for Research in Security Prices tapes—do not afford the insurance researcher adequate information in terms of number of insurers or companies that are representative of the industry as a whole, although the sample size would be

² Rejda (1989, p. 519) notes that about three-fourths of property-liability insurers are stock companies and that about 94 percent of life insurers are stock companies (although the 6 percent of the life insurers that are mutuals account for 53 percent of the assets and 41 percent of the life insurance in force).

³ Cochran's formula utilizes t square instead of z square. However, one must know the degrees of freedom in order to use the t table. Almost all marketing research textbooks have amended the formula to reflect the use of the z table value.

considerably larger than Hoyt and Trieschmann's if over-the-counter firms were considered. One cannot simply use convenient "shelf information" and suggest that it is representative of the stock company segment of the industry.

The work of Hoyt and Trieschmann can be representative of only the insurers examined. Because of the nonrandom selection process and the probable lack of a representative sample, their results are not generalizable to the populations of insurers examined.

References

- Cochran, William G., 1963, *Sampling Theory*, Second Edition (New York: John Wiley).
- Cox, Larry A. and Gary L. Griepentrog, 1988, Systematic Risk, Unsystematic Risk, and Property-Liability Rate Regulation, *Journal of Risk and Insurance*, 55: 606-627.
- The Fact Book: 1991 Property Casualty Insurance Facts*, 1991 (New York: Insurance Information Institute).
- Hoyt, Robert E. and James S. Trieschmann, 1991, Risk/Return Relationships for Life-Health, Property-Liability, and Diversified Insurers, *Journal of Risk and Insurance*, 58: 322-330.
- 1990 Life Insurance Fact Book*, 1990 (Washington, D.C.: American Council of Life Insurers).
- Rejda, George E., 1989, *Principles of Insurance*, Third Edition (Glenview, Ill.: Scott, Foresman).
- Scheaffer, Richard L., William Mendenhall, and Lyman Ott, 1979, *Elementary Survey Sampling* (North Scituate, Mass.: Duxbury Press).
- Warwick, Donald P. and Charles A. Lininger, 1975, *The Sample Survey: Theory and Practice* (New York: McGraw-Hill).

Copyright of Journal of Risk & Insurance is the property of Blackwell Publishing Limited and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.