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FACULTY WORKING
PAPER NO. 1003

Risk-Return Tradeoff, Income Measurement and Capital Asset Pricing For Life Insurers: An Empirical Investigation

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January 1984

Risk-Return Tradeoff, Income Measurement and Capital Asset Pricing For Life Insurers: An Empirical Investigation

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ABSTRACT

This study examines the risk-return tradeoff relationship and the behavior and components of both total and systematic risk for a sample of 40 stock life insurers for the period 1968 to 1978. Contrary to the results for industrial firms, nonsystematic risk is found to be relatively more important than systematic risk in explaining returns. Variables which partially explain the variation in risk measures are premium and asset growth rates, dividend payout, standard deviation of earnings and accounting beta. Related areas of investigation include several alternative income measures and an extension of the application of the cost of capital concept for life insurers.

I. Introduction

Studies analyzing the risk-return tradeoff and its implications for industrial firms have been done by Lintner [1965a], Miller and Scholes [1972], and Lee [1977]. And several researchers, including Beaver, Kettler, and Scholes [1970], and Rosenberg and McKibben [1973] and others, have used accounting information to explain the cross-sectional fluctuation of systematic risk for industrial firms. However, such analyses have not been done for the life insurance industry. The sources of risk and return for life insurers are not necessarily the same as for industrial firms, because of the fact that insurers' investments in common stocks, bonds, real estate, and other assets, as well as their mixture of business risk and investment risk, are unique, in comparison to those of industrial firms. Hence, the main purpose of this study is to test whether the risk-return tradeoff relationship and the cross-sectional behavior of total risk and systematic risk used to analyze the industrial firms are also applicable to life insurers. Additional related matters which are also dealt with include alternative income measures and the cost of capital concept for insurers.

In the next section, the relationship between the capital asset pricing model (CAPM) and the cost of capital for the life insurance industry is discussed. In the third section, the risk-return relationship for life insurers is explored. Factors influencing life insurers' total and systematic risk measures are investigated in detail in the fourth section. Finally, a summary and some implications of the empirical findings are presented.

II. Relationship of CAPM and Cost of Capital

The cost of capital concept is well-established as a helpful tool for industrial firms engaged in capital budgeting and financing decisions. Its usefulness for insurance companies is beginning to be explored. Launie [1971] discussed the potential calculation and use of cost of capital measures by insurers, and Haugen and Kroncke [1971] studied the relationship between cost of capital and insurance rate regulation. More recently, Lee and Forbes [1980] investigated several alternative methods of deriving estimates for the cost of equity capital for non-life insurers. Fairley [1979] and Hill [1979] suggested that the CAPM can be used to do profit regulation in property-liability insurance. This study seeks to extend the concepts and methods of applying the cost of capital idea for the insurance industry, particularly from the standpoint of stock life insurers.

The CAPM developed for Sharpe [1964], Lintner [1965], and Mossin [1966] is described by the relationship in equation (1):

$$E(R_{i,t}) - E(R_{f,t}) = \beta_i \, [E(R_{m,t}) - E(R_{f,t})] \qquad (1)$$

where $E(R_{i,t})$ = expected return on asset i during time t

$E(R_{f,t})$ = expected risk-free return during time t

$E(R_{m,t})$ = expected market return during time t

$$\beta_i = \frac{\text{Cov }(R_m, R_i)}{\text{Var}(R_m)} .$$

This model has been discussed extensively in both the finance and insurance literature; in its usual application, it is used to explain the level of common stock returns for an individual security or for a portfolio of securities. In the present context, $E(R_{i,t})$ is the firm's cost of equity capital. That is, it is the minimum required rate of return from investing in an equity-financed project. Lee and Forbes [1980] note that, while this CAPM-derived measure is theoretically the most desirable method of estimation, certain practical limitations exist. Among the problems are the required estimations of 1) the expected market return in excess of the risk-free rate and 2) the beta statistic for the individual firm. This study addresses the second of these issues, with respect to life insurance companies. Life insurers, like other financial firms, typically are not involved in the purchase of large amounts of fixed assets. But, as noted by Launie [1971, 268], a theoretical minimum required rate of return for investments in financial assets is as potentially useful for insurers as is the traditional cost of capital idea when applied to investments in fixed assets by industrial firms.

III. Risk-Return Relationships for Life Insurers

The application of financial theory to non-industrial firms in general, and life insurers in particular, is not well developed. Hammond, Melander and Shilling [1976], Hammond and Shilling [1978] and Kahane [1978] have investigated risk-return relationships for non-life insurers. Formisano [1978] and Harrington [1979] have investigated the dividend policy of stock life insurers, but a comprehensive study of the overall applicability of general financial theories to life insurers has not been done. Stowe [1978, 431] indicates that a major reason for the difficulty in this regard is the difference between financial and tangible assets. This idea, along with its implications for this study, was discussed in the previous section. In addition, financial institutions such as life insurers are subject to special borrowing-lending rate relationships (see

Gordon [1974]), their tax obligations are computed in a unique manner, and there are different income measures applicable for reporting earnings to different parties. Therefore, in light of these differences, it is useful to continue the investigation of the degree to which established financial theories are applicable to this type of firm.

Because of the many differences between life insurers and the industrial firms for which the CAPM was developed, the question arises as to whether the usual risk-return relationships are true for life insurers. A sample used in this study consisting of all stock insurers which primarily operated in the life insurance area and which had continuous price data available for the period 1968 to 1978 was examined. Due to considerable merger activity during this period, only 40 companies met these criteria. Table 1 indicates the insurers included in the study, along with three measures of size: admitted assets, insurance in force, and premium volume.

Insert Table 1 about here

Based on prices and dividend data obtained from Standard and Poor's ISL Daily Stock Price Index, monthly holding period rates of return, adjusted for stock splits, were calculated for each of the 40 insurers included in the sample. Standard deviations of return were calculated as a measure of each insurer's total risk, and systematic risk as measured by beta was estimated for each company using the following regression technique:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i (R_{m,t} - R_{f,t}) + \varepsilon_{i,t} \quad (2)$$

where α_i = intercept term

β_i = beta coefficient for the i^{th} insurer

$\varepsilon_{i,t}$ = error term.

The other variables are as defined for equation (1). The market index used was the Standard and Poor's 500, and the risk-free rate was approximated by monthly Treasury bill rates.

The average monthly rate of return for the 40 insurers during the sample period was 1.01%, with a range from -.23% to 2.63% and a standard deviation of .54%, as indicated in Table 2. The average variance of returns was 1.37%, and the average beta for this period was .7543, with a range from .0491 to 1.5438. The average beta (.7543) obtained from the ordinary least squares (OLS) method is somewhat lower than the average of .8536 obtained by Lee and Forbes [1980] for 34 non-life insurers during the period 1955 to 1975.[1] The range of betas for the firms in their study was also much smaller, with a low of .3293 and a high of only 1.1037. The clustering of betas close to 1.0 by non-life insurers might be a result of their relatively larger investments in common stocks, while life insurer assets include a larger percentage of fixed income securities, such as bonds, and a much lower proportion of common stocks (typically, less than 10 percent). Thus, the performance of stock in the life company would not be expected to follow the general market as closely as that of non-life insurance stocks.[2]

Insert Table 2 about here

A widely accepted tenet of capital market theory is that higher returns are associated with riskier securities. However, it must be remembered that the theory is stated in terms of expected returns as a function of expected, or ex ante, risk. Most of the empirical tests of the CAPM have, of necessity, utilized ex post risk and return measures. Sharpe [1982] cautions that it is difficult to estimate true ex ante beta values, and that actual ex post rates of return may bear very little relationship to such ex ante betas. With these limitations in mind, preliminary investigation of the risk-return relationships for life insurers was done. In order to investigate the relative importance of systematic vs. nonsystematic risk in explaining returns, regression coefficients were estimated for equation (3):

$$\overline{R}_i = a_0 + a_1\beta_i + a_2\sigma^2_{\varepsilon_i} + \varepsilon_i \tag{3}$$

where $\sigma^2_{\varepsilon_i}$ = variance of residuals for insurer i, and other variables are as previously defined,

β_i = estimated beta coefficient from either OLS or Dimson's method.

The estimated equation in terms of OLS beta estimates and Dimson beta estimates are listed in equation (3a) and (3b) respectively.

$$\overline{R}_i = \underset{(3.6223)}{.0120} + \underset{(1.2250)}{.0056}\,\hat{\beta}_i + \underset{(.6650)}{.1214}\,\sigma^2_{\varepsilon_i} \qquad \overline{R}^2 = .0360 \tag{3a}$$

$$\overline{R}_i = \underset{(6.5160)^*}{.0130} + \underset{(1.9420)^*}{.0026}\,\hat{\beta}_i + \underset{(3.0610)^*}{.3698}\,\sigma^2_{\varepsilon_i} \qquad \overline{R}^2 = .1840 \tag{3b}$$

[* denotes significance at 5% level]

Equation (3a) indicates that average rates of return of 40 life insurers during 1968-1978 are statistically not related to either systematic risk ($\hat{\beta}_i$) and nonsystematic risk ($\sigma^2_{\varepsilon_i}$). However, if the Dimson's both estimates are used, then the average rates of return are significantly related to both systematic risk and nonsystematic risk. This might be due to the fact that OLS beta estimates are subject to measurement errors as discussed by Dimson. Hence the Dimson's beta estimates will be used to study in the latter portion of this paper.

Results of equation (3b) indicate a strong positive relationship between return and nonsystematic risk, and a relatively weaker, positive relationship between return and systematic risk. This latter result may be somewhat surprising initially, but it must be remembered that both risk and return were measured on an ex post basis for this study. However, it does appear that the nonsystematic component is the more important one in terms of explaining the level of return. One possible explanation for this finding is the unique operations of life insurers relative to other types of firms. Foster [1975] found that the inclusion of an industry factor, in addition to a market factor (as in equation (2)), improved his ability to explain the variation in both non-life and life insurers' rates of return. This finding is in contrast to those for other industries (see Myers [1977]) and suggests that singular characteristics of the life insurance industry do indeed exist. These results also indicate that "Arbitrage Pricing Model developed by Ross [1976, 1977] and tested by Roll and Ross [1980] and others can be used to explain the risk-return relationship of life insurance industry. Comparing the results to the non-life insurance industry, Lee and Forbes [1980] found beta to be generally insignificant in explaining rates of return, however, they did not investigate the role of nonsystematic risk. Because risk has been shown to be important in explaining returns for life insurers, it is important for firm managers to understand 1) the degree of correspondence, if any, between past and future measures of risk, and 2) what controllable factors, if any, particularly impact upon the firm's risk posture.

As already discussed, risk is rarely estimated in an ex ante context. For example, in order to measure an insurer's cost of capital, the usual procedure would be to use the company's historical beta as an input for equation (1). Likewise, measurements of other types of risk are often used with the implicit, and often critical, assumption that the past calculation will remain a valid estimate of the insurer's risk in the future. With respect to beta, Sharpe and Cooper [1972] discuss the issue of stability for stocks listed on the New York Stock Exchange over the period 1926 to 1968. They found that while individual firm betas may change substantially from year to year, the betas for portfolios of securities exhibit a much greater degree of stability over time.

Harrington [1979] found evidence of beta instability for life insurers during his study period (1957-1968). In order to assess the more recent situation with respect to life insurers, the period examined in this study is divided into two subperiods of reasonably similar length (1968 to 1973, and 1974 to 1978). A comparison of the first few lines in Tables 3 and 4 reveals some interesting factors. The average rate of return and the total risk, as measured by the variance of returns, are not significantly different in the two subperiods. However, there is a considerable difference in the average beta for the 40 life insurers. During the first subperiod, the average beta is .9433; subsequently, it drops to .6880. The ranges of results around these averages is also quite different. The betas during the second subperiod are more dispersed and are spread over a much wider range than during the first five-year period. These results are important both for investors in life insurance stocks who need to assess the riskiness of insurers and for life company managers who need beta as an input for estimating costs of capital. While the findings indicate that total risk may remain relatively constant over time, no such assumption about systematic risk appears to be warranted. Thus, it is useful to investigate other methods of explaining and predicting total risk and beta.

Insert Tables 3 and 4 about here

IV. Factors Influencing Life Insurers' Risk Measures

Knowledge about the factors which determine a life insurer's risk is important for several reasons. As demonstrated earlier in this paper, an insurer's nonsystematic risk is significantly positively related to the rate of return for the firm's common stock. Also, the insurer's beta, or systematic risk component, is a necessary input for measuring the company's cost of capital. If these risk measures are directly explainable by the levels or changes in certain variables controllable by the insurer, then firm managers are in a position to affect the level of risk through their management activities. Hence, they may be able to partially influence both the stock return and the firm's cost of capital.

Numerous studies have addressed the problem of finding the real determinants of risk for industrial firms. Among the first was the work by Beaver, Kettler and Scholes [1970] (hereafter, BKS), who looked at the relationship between beta and seven accounting variables. BKS were able to explain nearly 45 percent of the variation in beta through regression analysis, with the most useful independent variables being dividend payout, asset growth, and variability of earnings. The same relationship was not able to predict future beta values nearly as well, however. Subsequent inquiries have found other accounting variables which may be useful in explaining beta. Several of these studies are summarized by Myers [1977], who also synthesizes prior work (both theoretical and empirical) in this area to arrive at a list of variables which appear to have a major bearing on industrial firms' betas. These factors are: earnings volatility, financial leverage, growth, and cyclicality. This latter term is used to describe the degree to which variability in earnings for one firm corresponds with variability of all firms' earnings. The current study focuses on the question of whether these same variables are important determinants of risk for life insurers. In addition, certain dividend-related variables are also examined, due to their importance in explaining stock returns for non-life insurers (see Lee and Forbes [1980]).

Explanatory Variables[3]

The leverage measure used in this study is defined as:

$$L_i = \frac{\sum_{j=1}^{N} (PR_{ij}/AA_{ij})}{N} \qquad (4)$$

where L_i = leverage measure for insurer i

PR_{ij} = net policy reserves for insurer i in year j

AA_{ij} = total admitted assets for insurer i in year j

N = number of years in period examined.

This leverage measure is the one suggested by Launie [1971], and is similar to the insurance leverage concept adopted by many studies dealing with property-liability insurers (see Haugen and Kroncke [1971] and Quirin and Waters [1975]. In the life insurer case, the policy reserves are viewed as "semi-debt" components in the company's capital structure, in that they arise out of the sale of insurance, which provides the insurer with funds for investment purposes. Table 2 summarizes the value found for this and the other sample statistics for the study period 1968 to 1978, and Tables 3 and 4 present similar information for the two subperiods. All non-price data were obtained from Best's Insurance Reports - Life and Health. The policy reserve figure reported in Best's, which is used to compute L_i in equation (4), is an aggregate figure, which takes into account the policy reserves for life, health, and annuity business, as well as supplementary contracts with and without life contingencies. The average leverage measure for the complete study period is 71.52%, with very little difference between the two subperiods, and a fairly wide range of such measures for the 40 insurers studied.

Three measures of insurer growth were identified. Growth measure A is the average annual percentage change in an insurer's total premium volume. Measure B is the average annual percentage change in insurance in force, and growth measure C is the average annual percentage change in total admitted assets. As indicated in the tables, premium volume grew substantially more during subperiod 2, with the average for the entire period being an annual percentage change of 22.86%. The opposite situation occurred with respect to insurance in force. The average annual increase for the 11-year period was about 15 percent, with the greater growth occurring during subperiod 1. With respect to each measure, the greater variability of results also occurred in the subperiod experiencing the higher average growth. The third measure, relating to growth in admitted assets, was very similar during both subperiods, with the average overall rate being 11.75%. Both the range and standard deviation of results for measure C were also comparable during both periods.

A third explanatory variable is dividend yield, which is the average annual stockholder dividend per share divided by the insurer's year-end stock price. The average for the 40 insurers was 2.41%, with the yield during the second subperiod being more than double that of the first. However, the second period results tend to be dominated by the abnormal experience of only one or two insurers.

The other explanatory variables all are related to the earnings measures used in this study. For industrial firms, the key, but sometimes ambiguous, role played by earnings has been demonstrated in many aspects of traditional financial theory. For instance, in their study showing how the relevant cost of capital measure for investment decisions can be inferred from security market values, Miller and Modigliani [1966] admitted the crucial importance of earnings in the valuation model. But in their empirical application of their theory to the electric utility industry, it was argued that an accounting earnings measure is only a proxy for economic earnings. Several studies involving insurance companies have had similar problems. Foster [1977] investigated the usefulness in company valuation of three different earnings measures for non-life insurers. He found that the inclusion of capital gains and losses (both realized and unrealized) in the earnings measure resulted in the best valuation model, despite the prior claims to the contrary made by many insurance security analysts (see [1]). Similarly, Lee and Forbes [1980] used four earnings measures in their study on the importance of dividend policy for non-life insurers.

In the limited applications of financial theory to the life insurance industry, problems associated with alternative earnings have also been shown to be important. Formisano [1978] found earnings to be significant in explaining dividend decisions, but it is unclear as to how earnings were measured in the study. Harrington [1979] used three measures of statutory earnings in his study of dividend policy, and found that the inclusion of capital gains and losses in the definition of earnings tended not to influence life insurer decisions about dividend payments to stockholders. Finally, in a preliminary look at the impact of requiring life insurers to report adjusted as well as statutory earnings, Foster [1975] provided some evidence that the aggregate stock market implicitly adjusted statutory earnings measures before 1973, when the reporting requirement went into effect for life insurers. Thus, there is considerable confusion as to how earnings should properly be measured for purposes such as that of the current study. Rather than arbitrarily choose one measure, four different earnings quantities are considered here. Note that all these four measures are statutory in nature.

Earnings measure A is the net gain from operations after policyholder dividends and federal income taxes. Revenue reflected in this earnings measure is derived from numerous sources, including premiums for insurance protection, payments for supplementary contracts, and net investment income (exclusive of capital gains). Expenses subtracted included benefit and associated interest payments, increases in some reserves, commissions, insurance taxes, and other general operational expenses. Policyholder dividends are deducted from the net gain, as is done in the convention blank statement of the National Association of Insurance Commissioners (NAIC). As explained in Carter [1977, 158], this procedure is usually followed for two reasons, even though policyholder dividends are actually distributions of surplus. First, the payment of such dividends represents a distribution from the current year's increase in surplus due to operations. And second, policyholder dividends may be partially deducted when calculating federal income taxes. In computing earnings measure A, it should be noted that the federal income tax subtraction does not reflect any tax on capital gains.

Earnings measures B, C, and D modify measure A in order to reflect the effects of capital gains and losses. This component is generally separated from the net gain from operations because of its potentially transitory nature. As explained more fully in Carter [1977, 158-159], annual income would be more variable with the inclusion of capital gains and losses. This aggregation might lead to a misplaced emphasis by management on the realization of capital gains instead of on "an orderly growth in income" (Carter [1977, 158]) in the administration of investment activities. In fact, when the Accounting Principles Board originally proposed that all capital gains and losses, both realized and unrealized, be reflected in insurers' income statements, the insurance industry opposed the idea by arguing that such a change would distort investors' opinions and cause stock prices to decline (see [1]). Hence, the net gain from operations (measure A) has been traditionally separated from capital gain and loss components. However, due to the seeming importance of capital gains and losses identified in some prior studies, this study uses several earnings measures which consider not only the net gain from operations, but also the capital gains and losses. Earnings measure B is equal to earnings measure A plus net realized and unrealized capital gains. However, many uncertainties exist in the definition of unrealized gains and losses. For example, realized gains and losses are reported net of associated income tax effects, while unrealized gains and losses are set forth without any accounting for potential tax consequences. Also, fluctuation in security market values are somewhat to be expected (as discussed further in the next paragraph) and do not necessarily imply permanent impairment or improvement of an insurer's portfolio. Therefore, a third earnings measure which considers only realized gains and losses is considered. That is, measure D equals earnings measure A plus net realized capital gains.

In most cases, the addition of only the net capital gains to net gain from operations does not totally reflect the effects of security transactions. Life insurers are required to maintain a liability account entitled the Mandatory Security Valuation Reserve (MSVR) to partially absorb fluctuations in the market value of securities held by the insurers. A brief explanation of the MSVR is provided here; a more complete discussion can be found in Robinson [1977]. The reserve is divided into two components (bond and preferred stocks, and common stocks), and insurers are required annually to add an amount computed by formula to each component, subject to certain maximums. All realized and unrealized capital gains must be added to the MSVR until it has reached its maximum, and all capital losses (both realized and unrealized) must be subtracted from the MSVR until it is reduced to zero. Thus, a capital gain (loss), which increases (decreases) surplus, may be completely offset by an increase (decrease) in the MSVR, which decreases (increases) surplus. The MSVR absorbs gains and losses as long as it has reached neither its maximum nor minimum (zero) levels, and thus partially insulates surplus from potentially large fluctuations due to changing security market values. Therefore, the complete balance sheet effect of capital gains and losses is obtained only in conjunction with changes in the MSVR. Earnings measure C is equal to earnings measure B minus (plus) the increase (decrease) in the MSVR. Measure C represents, therefore, an earnings figure reflecting the change in surplus due to net realized and unrealized capital gains which are not offset by changes in the MSVR.

One set of explanatory variables related to the earnings measures is dividend payout. Four versions (A-D) of this variable correspond to the five similarly labelled measures of earnings. In general, dividend payout is the average annual stockholder dividend per share divided by the earnings per share for the year. A second set of variables is the standard deviation of earnings per share, computed for each of the earnings measures. This variable measures the volatility of earnings and is included in the list by Myers [1977] of those factors which influence industrial firms' betas. Finally, accounting or earnings betas were computed for each measure of earnings. This variable represents the cyclicality factor noted by Myers [1977] and equals the slope coefficient obtained from regressions of the insurer's earnings per share on the average earnings per share for the entire sample. The use of average sample earnings is a common proxy for industry earnings and was used by Foster [1975] in his life insurance study.

Some summary information concerning the earnings-related explanatory variables is found in Tables 2, 3, and 4. In general, there are considerable differences in the four earnings measures. One manifestation of these variations is found by examining the dividend payout numbers. The same dividend figure is used in each case; therefore, the different payout results are strictly a function of differences in earnings. As expected, the series involving measure B are, in most cases, the most volatile. Just looking at the payout results, the averages tend to be higher, for most of the earnings measures, during subperiod 2. However, it should again be noted, when analyzing these results, that a few insurers paid some abnormally high dividends during this period. The standard deviations of earnings exhibit the least amount of differences according to earnings measures, and there is generally a lower amount of dispersion during subperiod 2. In looking at the accounting betas, the results shown in Tables 3 and 4 are, by necessity, based on only a very few observations included in the regression analyses. Thus, more confidence might be placed in the accounting betas reported in Table 2 for the entire sample period, although even in this case, each insurer's beta was estimated using only 11 annual observations. Such a situation is not unusual in estimating accounting betas. Foster [1975] was forced to use only 8 observations in making similar calculations. His accounting betas averaged close to 1.0 for life insurers. In this study, there is a wide range and dispersion of such betas among the 40 insurers, with those based on earnings measures B and C being the least volatile, as expected. The accounting betas are within a more meaningful range than in the case with the other measures. Attention is now turned to the utilization of these variables in an attempt to explain life insurers' total and systematic risk.

Analysis. Regression analysis was done to estimate the coefficients a_i and b_i in the following two equations:

$$\sigma_j^2 = a_0 + a_1 X_{1j} + a_2 X_{2j} + a_3 X_{3j} + a_4 X_{4j} + a_5 X_{5j} + e_{1j} \qquad (5)$$

$$\beta_j = b_0 + b_1 X_{1j} + b_2 X_{2j} + b_3 X_{3j} + b_4 X_{4j} + b_5 X_{5j} + e_{2j} \qquad (6)$$

where σ_j^2 = total risk for insurer j

β_j = systematic risk for insurer j

X_{1j} = leverage factor for insurer j

X_{2j} = dividend payout for insurer j

X_{3j} = growth factor for insurer j

X_{4j} = standard deviation of earnings for insurer j

X_{5j} = accounting beta for insurer j

a's and b's = regression coefficients

Several different versions of equations (5) and (6) were estimated, with variations due to time periods and different definitions of earnings and growth.

Insert Table 5 about here

Both whole period data and two subperiod data are used to estimate equations (5) and (6). Tables (5a), (5b) and (5c) report the results of total variance regression of equation (5). The whole period results as indicated in Table 5a show that standard deviation of earnings and accounting beta are two major variables in explaining total variance. In addition, growth rate measure C and dividend payout in terms of earnings measure D are also important in explaining the total variance. Results of Table 5b also show that standard deviation of earnings, growth and payout ratio are important in explaining the variations of total variance. Table 5c shows that there are no accounting variables that can be used to explain the cross-sectional fluctuation of total variance in the second subperiod.

Tables (6a)-(6c) report the beta regression of equation (6). For the whole period, only the growth rate measure A in terms of earnings measure B is important in explaining the cross-sectional relation of beta coefficients. In the first subperiod, growth rate measures and accounting beta in terms of earnings measure B are important in explaining the fluctuation of beta cross-sectionally. Finally, Table 6c shows that only accounting betas in terms of earnings measure C are important in explaining the cross-sectional beta fluctuation in the second period.

Insert Table 6 about here

V. Summary and Implications

One of the goals of this study has been to further investigate the role of the cost of capital concept for life insurers. Although its derivation through the CAPM is recognized as being desirable from a theoretical standpoint, a major practical problem in computing it has been the difficulty of estimating an insurer's beta as a necessary input. This research has addressed the problem of establishing the real determinants of total risk and beta for insurers, as a way to facilitate their use of the idea of a cost of capital. If a historical relationship between both total risk and beta and various characteristics of an insurer can be verified, it may be easier to forecast beta. For instance, many of the variables that have been shown to influence the level of beta for industrial firms are controllable, to some extent, by firm managers. Their future values are, therefore, often not difficult to predict. A reliable historical link between life insurers' betas and several variables whose values are relatively easy to control and/or predict by management would be useful in beta forecasting. Without some identification of relevant explanatory factors, it is hard for managers to have any impact on an insurer's risk posture. To that end, therefore, regression analysis was performed to test the past relationship that existed for 40 life insurers. Overall, the investigated characteristics were able to explain only a very small amount of the variation in beta. Only growth and accounting betas were found to be significant in explaining beta. The results of the associated examination of factors which may determine an insurer's total risk were similar, in that growth, s.d. of earnings, accounting beta and dividend payout were shown to be significant factors, and the overall explanatory power of the model was weak. These findings indicate that the search for relevant variables must continue. For example, items such as a firm's size, its growth in earnings, and its asset beta have been tested in a few previous studies and could be investigated for insurers. However, in light of the relative importance of nonsystematic risk in explaining returns for life insurers, particular emphasis in the search for explanatory factors should be placed on examining features unique to life insurers. For instance, changes in an insurer's liquidity position due to alterations in the demand for policy loans might be a relevant item to be included in future analyses. In addition, if one can be found, an insurer earnings index better than the sample average would be useful in calculating meaningful accounting betas for use as a possible explanatory factor.

Several supplementary inquiries were also undertaken within the context of the previous discussion. One of these additional investigations involved a comparison of the average betas obtained for life insurers in this study to averages reported elsewhere for other industries, including non-life insurance. The average life insurer beta reported herein indicates the existence of a lower level of systematic risk for life insurance industry than for the non-life insurance and banking industries, as well as for the majority of non-financial industries, over a similar time period. The historical average OLS beta of .7543 implies that if the aggregate market return in excess of the risk free rate was one percent, then the excess return from investing in the stocks of life insurers was just over three quarters of one percent. Similarly, during periods of declining aggregate market returns, life insurance stocks depreciated at a slower than average rate. Investments in such stocks could, therefore, be labelled as having been defensive during the 11-year period examined in this study.

A second area that was peripherally examined involved the nature of the risk-return relationship for stocks of life insurers. The non-systematic component was much more important than the systematic one in explaining the levels of returns. This finding reinforces the already discussed need to identify those insurer-specific and/or industry-specific factors which determine a company's risk posture.

A third additional finding of this study involved the stability over time of risk measures for insurers. It was shown that total risk, as measured by the variance of returns, is much less volatile than is systematic risk. Therefore, whereas researchers and others should be fairly cautious in using historical betas as proxies for the future, more confidence may be possible in using past total risk computations as estimates for the future. However, the lack of stability in the systematic risk calculations strengthens the arguments supporting the need to further identify the real determinants of beta.

Finally, in conjunction with the other goals pursued, this study examined four different measures of life insurer earnings. As expected, definition A was the least volatile, while B exhibited the most variability. The use of the different earnings measures did not have a lot of effect in explaining the risk measures. Additional research appears to be necessary before definite conclusions can be drawn about the role of earnings in explaining market behavior.

Table 1

Insurers Included in Study and Size Data for 1978
(000's omitted)

Company	Admitted Assets	Insurance in Force	Premiums
1. American Bankers Life Assurance Co. of Florida	$ 209,618	$ 8,137,705	$119,483
2. American Capitol Insurance Co.	31,955	385,773	5,940
3. American Fidelity Life Insurance Co.	116,477	1,228,583	19,161
4. American Income Life Insurance Co.	97,304	1,504,894	62,597
5. Bankers Security Life Insurance Co.	129,788	3,409,446	50,902
6. Chesapeake Life Insurance Co.	52,476	446,028	14,042
7. Colonial Life and Accident Insurance Co.	108,881	620,123	73,106
8. Combined Insurance Co. of America	813,719	4,307,517	485,678
9. Continental American Life Insurance Co.	275,330	1,582,388	43,182
10. Farm and Home Life Insurance Co.	67,686	525,985	8,200
11. Fidelity Union Life Insurance Co.	462,773	6,308,951	91,498
12. First Colony Life Insurance Co.	139,614	4,159,666	46,307
13. First Federated Life Insurance Co.	26,481	1,649,690	10,491
14. Globe Life and Accident Insurance Co.	148,241	3,764,007	76,932
15. Government Employees Life Insurance Co.	173,497	2,039,500	29,198
16. The Independent Life and Accident Insurance Co.	556,236	3,948,335	187,629
17. Jefferson National Life Insurance Co.	179,551	2,189,426	53,391
18. Kansas City Life Insurance Co.	789,519	4,036,570	96,396
19. Kentucky Central Life Insurance Co.	319,336	3,868,727	73,272
20. Liberty National Life Insurance Co.	1,432,620	9,574,191	254,213
21. Life Insurance Co. of Georgia	819,295	6,487,748	173,290
22. Lincoln Income Life Insurance Co.	86,557	1,964,883	33,951
23. Loyal American Life Insurance Co.	40,542	1,324,319	16,295
24. Modern Security Life Insurance Co.	32,467	507,145	4,821
25. Mutual Savings Life Insurance Co.	137,747	925,842	35,315
26. National Old Line Insurance Co.	218,625	4,297,356	41,775
27. National Reserve Life Insurance Co.	153,083	1,148,163	16,165
28. National Western Life Insurance Co.	295,764	1,824,035	39,275
29. Pacific Standard Life Insurance Co.	80,214	1,476,838	31,280
30. Northwestern National Life Insurance Co.	1,339,528	20,112,866	272,834
31. Peninsular Life Insurance Co.	126,845	1,298,190	33,490
32. Protective Life Insurance Co.	315,592	5,271,483	123,290
33. Provident Life and Accident Insurance Co.	1,588,244	25,990,160	755,256
34. Republic National Life Insurance Co.	587,048	13,324,139	336,690

Table 1 (cont.)

Company	Admitted Assets	Insurance in Force	Premiums
35. Security-Connecticut Life Insurance Co.	93,207	4,122,860	52,835
36. Security Life and Accident Co.	170,346	3,431,083	39,961
37. Southern United Life Insurance Co.	26,787	705,410	14,266
38. Standard Life Insurance Co. of Indiana	105,506	575,426	14,132
39. United Services Life Insurance Co.	330,532	2,926,754	40,587
40. Windsor Life Insurance Co. of America	10,705	206,343	2,732
Mean	$ 317,243	$ 4,040,212	$ 96,996

Table 2

Summary Information for Complete Sample Period (1968-1978)

Variable	Mean for all Co.'s	S.D.	Minimum Observation	Maximum Observation
Ave. Rate of Return	0.0101	0.0054	-.0023	0.0263
Total Variance	0.0137	0.0071	0.0051	0.0400
Beta (OLS)	0.7543	0.335	0.0491	1.5438
Beta (Dimson)	0.9276	0.4228	-0.1500	2.3594
Leverage	0.7152	0.1273	0.3405	0.8657
Dividend Yield	0.0241	0.0140	0.0	0.0538
Growth A	0.2286	0.7086	0.0311	4.6440
B	0.1504	0.1397	0.0438	0.8727
C	0.1175	0.0495	0.0388	0.2607
Dividend Payout A	0.2811	0.2928	-0.3510	1.4888
B	0.5038	1.1969	-0.9881	6.9486
C	0.3810	0.5728	-0.5258	2.9158
D	0.3375	0.3595	-0.1848	1.5759
S.D. of Earnings A	0.8541	2.0813	0.1310	13.6600
B	1.3657	2.7446	0.1735	17.8570
C	1.1726	2.5460	0.1224	16.6870
D	1.0215	2.7335	0.1284	17.9440
Accounting Beta A	0.1564	5.5182	-33.6430	5.4420
B	0.8088	1.3026	-4.5240	5.2146
C	0.5693	2.6095	-14.723	4.1324
D	0.2708	5.4507	-32.978	5.046

Table 3

Summary Information for Subperiod 1 (1968-73)

Variable	Mean for all Co.'s	S.D.	Minimum Observation	Maximum Observation
Ave. Rate of Return	0.0039	0.0080	-0.0126	0.0188
Total Variance	0.0128	0.0052	0.0050	0.0262
Beta (Dimson)	0.9433	0.4745	-0.2391	2.0897
Leverage	0.7030	0.1426	0.2777	0.8491
Dividend Yield	0.0163	0.0134	0.0	0.0466
Growth A	0.1222	0.0622	0.0163	0.2801
B	0.1844	0.2488	0.0170	1.5427
C	0.1136	0.0565	0.0289	0.3480
Dividend Payout A	0.2854	0.4904	-0.6150	2.6802
B	0.3853	0.8918	-1.2959	4.7697
C	0.3522	0.8386	-0.6853	5.1960
D	0.3937	0.6312	0.0	2.9146
S.D. of Earnings A	0.7370	2.2775	0.0591	14.838
B	1.3223	3.1302	0.1337	20.302
C	1.1014	2.9502	0.6512	19.075
D	0.9404	3.1039	0.0942	20.221
Accounting Beta A	-1.5303	15.848	-99.781	9.2819
B	0.9419	1.1818	-1.6048	5.4877
C	0.4153	3.7154	-19.459	9.9276
D	-0.3453	8.1508	-50.080	5.5124

Table 4

Summary Information for Subperiod 2 (1974-1978)

Variable	Mean for all Co.'s	S.D.	Minimum Observation	Maximum Observation
Ave. Rate of Return	0.0174	0.0099	-0.0062	0.0445
Total Variance	0.0146	0.0112	0.0019	0.0639
Beta (Dimson)	0.6880	1.0926	-2.6195	3.3820
Leverage	0.7298	0.1173	0.4159	0.8912
Dividend Yield	0.0334	0.0188	0.0	0.0628
Growth A	0.3562	1.5601	-0.0117	10.089
B	0.1097	0.0666	-0.0248	0.308
C	0.1220	0.0617	0.0419	0.2942
Dividend Payout A	0.2759	0.1843	-0.0342	0.6703
B	0.6461	2.3090	-1.1964	14.362
C	0.4156	0.6510	-0.9876	3.6234
D	0.2700	0.2304	-0.5301	0.7272
S.D. of Earnings A	0.4940	0.4186	0.0931	2.3778
B	0.9653	0.9058	0.1055	5.5106
C	0.7864	0.6442	0.0974	3.3415
D	0.5550	0.4564	0.0924	2.3666
Accounting Beta A	1.0880	1.3632	-1.3621	4.2223
B	0.9322	1.0416	-0.842	5.3988
C	1.0015	0.9841	-1.3028	4.3095
D	1.2005	1.4197	-1.0111	4.5467

Table 5a

Total Variance Regression (1968-1978)

Earnings Measure	Growth Measure	Constant	Leverage	Dividend Payout	Growth	S.D. of Earnings	Accounting Beta	$\bar{R}^2$
A	A	0.0190**				-0.0036**	-0.0012**	0.111
A	B	0.0240**				-0.0038**	-0.0013**	0.078
A	C	--			0.0502*	-0.0029*	-0.0010*	0.143
B	A	0.0149**				-0.00086*	-0.0016*	0.058
B	B	0.0195**				-0.00094*	-0.0018*	0.019
B	C	--			0.0587*			0.119
C	A	0.0159**				-0.0018**	-0.0015*	0.081
C	B	0.0214**				-0.0020**	-0.0016*	0.053
C	C	--			0.0549*	-0.0015*		0.124
D	A	0.0196**		-0.0056*		-0.0024*		0.164
D	B	0.243**				-0.0025*	-0.0011*	0.134
D	C	--		-0.0055*	0.0523*	--		-0.212

**Denotes significance at 5% level.

*Denotes significance at 10% level.

Table 5b

Total Variance Regression (1968-1973)

Earnings Measure	Growth Measure	Constant	Leverage	Dividend Payout	Growth	S.D. of Earnings	Accounting Beta	$\bar{R}^2$
A	A	--						0.027
A	B	0.135**				-0.0032*		-0.013
A	C	--			0.0304*	-0.0027*		0.069
B	A	0.0096*						0.022
B	B	0.0137**						-0.001
B	C	--						0.061
C	A	--						-0.037
C	B	0.0121**						-0.107
C	C	--			0.0333*			-0.004
D	A	0.0123*						0.045
D	B	0.0151**		-0.0025*				0.042
D	C	--						0.088

**Denotes significance at 5% level.

*Denotes significance at 10% level.

Table 5c

Total Variance Regression (1974-1978)

Earnings Measure	Growth Measure	Constant	Leverage	Dividend Payout	Growth	S.D. of Earnings	Accounting Beta	$\bar{R}^2$
A	A	0.023*						0.040
A	B	0.028**						0.001
A	C	--						0.045
B	A	--						-0.010
B	B	--						-0.045
B	C	--						0.014
C	A	--						0.067
C	B	0.025*						0.048
C	C	--						0.066
D	A	--						-0.009
D	B	0.026*						-0.052
D	C	--						0.025

**Denotes significance at 5% level.

*Denotes significance at 10% level.

Table 6a

Beta Regression (1968-1978)

Earnings Measure	Growth Measure	Independent Variables: Constant	Leverage	Dividend Payout	Growth	S.D. of Earnings	Accounting Beta	$\bar{R}^2$
A	A	0.908*						-0.027
A	B	1.032**						-0.090
A	C	--						-0.100
B	A	0.745*			0.179*			-0.014
B	B	0.859*						-0.102
B	C	--						-0.104
C	A	0.851*						-0.010
C	B	0.963**						-0.082
C	C	--						-0.089
D	A	0.847*						-0.036
D	B	0.967*						-0.106
D	C	--						

**Denotes significance at 5% level.

*Denotes significance at 10% level.

Table 6b

Beta Regression (1968-1973)

Earnings Measure	Growth Measure	Constant	Leverage	Dividend Payout	Growth	S.D. of Earnings	Accounting Beta	$\bar{R}^2$
A	A	--						-0.068
A	B	1.113**						-0.133
A	C	--			3.182*			-0.025
B	A	--						-0.020
B	B	1.104**					-0.126*	-0.038
B	C				2.881*			0.036
C	A	--			2.597*			-0.047
C	B	0.979**						-0.139
C	C	--			3.376**			-0.016
D	A	--						-0.054
D	B	1.124**						-0.096
D	C	--			2.964*			-0.013

**Denotes significance at 5% level.

*Denotes significance at 10% level.

Table 6c

Beta Regression (1974-1978)

Earnings Measure	Growth Measure	Constant	Leverage	Dividend Payout	Growth	S.D. of Earnings	Accounting Beta	$\bar{R}^2$
A	A							-0.069
A	B							-0.086
A	C							-0.093
B	A							0.008
B	B							-0.015
B	C							-0.023
C	A							0.044
C	B	--					0.527**	0.015
C	C	--					0.530**	0.013
D	A							-0.055
D	B							-0.071
D	C							-0.078

**Denotes significance at 5% level.

Footnotes

[1]Since most of the firms are traded in over the counter (OTC) market. Some of these firms are infrequently traded. For the ramifications of infrequent trading for the estimation of beta values, Dimson's (1979) estimator is used to estimate the beta. Both OLS and Dimson beta estimates are listed in appendix A. Average Dimson beta estimate is .9276 as indicated in the table. This method is suggested by an anonymous referee.

[2]Sharpe [1982] notes that firms in industries with higher cyclical demand factors will tend to have higher betas than those in industries with a relatively more stable demand. This factor would also tend to explain the higher beta for non-life companies than for the life insurers in this study. To put these betas in perspective, however, it is useful to compare them to historical betas found in various non-financial industries. Rosenberg and Guy [1976] report the average betas for the period 1966 to 1974 for stocks of firms in several industries. Those with relatively large betas during this time include air transport (1.80), real property (1.70), travel (1.66), and electronics (1.60). Those with relatively low betas include gold (.36), energy and utilities (.60), and telephones (.75). The banking industry had an average beta of .81, which is not surprising, given the similar betas reported for insurers by this study and by Lee and Forbes. Harrington [1979] calculated some life insurer market betas in conjunction with his dividend study, but the time period used (1957-1968) is much earlier than the one used in this study.

[3]Detailed definitions and calculation procedures of the variables discussed in this section are available from the authors upon request.

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Appendix A

Comparisons of Beta Coefficients Estimated by the OLS and Dimson Methods

	Total Period: 1968-1978		Subperiod 1: 1968-1973		Subperiod 2: 1974-1978	
Company	OLS	Dimson	OLS	Dimson	OLS	Dimson
1	0.965	0.814	1.056	0.590	0.926	0.766
2	0.513	0.824	0.495	1.281	0.517	0.566
3	1.001	0.409	1.384	2.090	0.672	-1.040
4	0.678	1.123	0.804	1.287	0.547	0.752
5	0.907	1.171	0.950	0.569	0.844	0.679
6	0.422	0.771	0.498	0.587	0.327	0.938
7	0.880	1.103	0.781	0.467	1.005	1.344
8	1.002	1.000	1.065	0.743	0.924	1.396
9	0.440	0.773	0.377	0.940	0.475	0.240
10	0.412	0.938	0.315	0.722	0.490	0.744
11	1.085	1.157	1.004	1.180	1.165	1.156
12	0.937	1.444	1.260	1.686	0.644	0.217
13	0.410	0.741	0.626	1.142	0.224	0.006
14	1.544	1.628	1.643	1.666	1.448	1.588
15	0.437	-0.150	0.868	0.898	1.079	-2.619
16	1.114	1.165	1.211	0.564	1.065	1.436
17	0.900	1.488	0.924	1.203	0.907	2.155
18	0.769	1.162	0.769	1.038	0.768	3.382
19	0.898	0.998	1.034	0.802	0.777	0.397
20	0.589	0.440	0.615	0.315	0.610	1.693
21	0.666	1.049	0.947	1.439	0.411	0.057
22	0.530	0.701	0.714	0.874	0.340	-0.620
23	0.547	0.466	0.687	0.835	0.416	-0.104
24	0.190	0.422	0.408	1.101	-0.006	-0.513
25	0.199	0.701	0.358	1.157	0.037	-0.218
26	0.836	0.878	1.024	0.493	0.663	0.631
27	0.685	1.351	0.621	1.441	0.701	1.282
28	1.123	1.123	1.063	1.014	1.202	0.759
29	1.244	1.088	1.082	1.740	1.390	0.684
30	1.021	0.786	0.974	0.132	1.067	1.008
31	0.758	0.750	0.978	1.326	0.559	-1.001
32	0.373	0.600	0.422	0.471	0.308	0.774
33	0.340	0.842	0.157	0.495	0.510	1.767
34	1.339	2.359	1.237	1.660	1.391	1.751
35	0.839	1.092	0.651	0.752	1.004	-0.390
36	0.744	1.291	0.920	1.151	0.552	0.355
37	0.049	0.077	-0.209	-0.239	0.289	-0.035
38	0.548	0.938	0.465	0.966	0.583	0.910
39	0.958	1.080	1.208	0.714	0.727	1.317
40	1.280	0.873	0.868	0.443	1.642	3.321